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DELIVERABLE D3.2

Report on the organization of one-week courses, webinars and scientific bulletin

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EXECUTIVE SUMMARY

The present deliverable collects the information available at M30 of the ENEN2Plus project about the work performed and planned for Task 3.2.

Since the task has a timeline spread over M1 to M48, the information reported herein constitutes a snapshot of an ongoing work, in which several activities have been performed or are in progress, while others have been planned for the next future.

In particular, two one-week courses have been already run, while three are being planned. Moreover, two series of numerous webinars were already held and reported (20 in the academic year 2022-2023 and 33 in the academic year 2023-2024) and several issues of a Bulletin have been prepared and published.

The results of the actions reported herein show a lively activity being performed in the frame of this Task, following and even exceeding the results expected in the planning of the ENEN2Plus project.

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1 INTRODUCTION

Task 3.2 of the ENEN2Plus project addresses "E&T for new applications and innovation in nuclear and radiation technologies". Among the means to be adopted to achieve the goal of spreading nuclear culture on new applications and innovation the following ones have been identified in the description of work:

- creating educational material and one-week courses;
- organising webinars;
- compiling scientific bulletins introducing professions and technological novelties.

Several partners in the ENEN2Plus project are involved in these actions. In particular, IST, SCK CEN, UNIVLEEDS, KIT and CHALMERS are in charge of organising the mentioned one-week courses, while the University of Pisa, with the cooperation of the other CIRTEN representatives, offered to provide the organisation of webinars; finally, BME took in charge the compilation of periodic Bulletins, with the cooperation of other partners.

The works of the task were started with the KoM of WP3 that was held on November 7th, 2022. Then, a specific Progress Meeting for Task 3.2 was held on February 3, 2023 and on February 20, 2023 a further meeting was held to plan for the actions necessary to set up the Bulletin. From that time on, actions for implementing the decided initiatives went on according to the general planning, with a very good cooperation among partners.

Owing to the fact that the timeline of Task 3.2 is from M1 to M48 of the project, while this deliverable is due by M30, the report presents a mix of performed and planned actions that anyway well respond to the commitments taken at the level of Grant Agreement.

In particular:

- two one-week courses have been already held by IST and Chalmers University;
- three one-week courses are planned for the next year by SCK CEN, KIT and the University of Leeds;
- two series of webinars, including respectively 20 and 33 nearly one-hour presentations, have been held in two academic years by the University of Pisa, recording and making available the related content;
- several issues of the Bulletin have been issued and more are being prepared for the next years of the project.

Overall, this document, which reports the progress at M30 of the actions in Task 3.2, presents a picture of lively and effective activities, closely following and even exceeding initial expectations.

2 ORGANISATION OF ONE-WEEK COURSES

2.1 Course by IST

Under the framework of Task 3.2, the course "Innovative Radionuclides and Radiopharmaceuticals" has been held at CTN, from 24th to 28th June 2024, with coordination by the IST partner (check the programme course at the link https://www.dropbox.com/scl/fi/kjo6s29ju6vc6ml5kvfpf/IST-Course_Programme.pdf?rlkey=wh2r250r0c2pmaox89k8pj0rw&dl=0). One major goal of the course was to acquaint the trainees with practical skills and scientific knowledge useful to understand the most important aspects required to bring medical radionuclides and radiopharmaceuticals from the bench to the bedside.

It was a quite successful initiative, and 19 applicants manifested their interest to participate in the course, from which we have selected 11 to participate in the event. To select the candidates the following main criteria were considered: i) education and expertise related with the course; ii) impact of the course on academic and/or professional path; iii) gender balance; iv) geographical distribution.

The 11 international participants attended theoretical lectures on hot topics of Radiopharmaceutical Sciences, comprising radiolabelling chemistry, in silico approaches, methods for preclinical studies with cellular and animal models, and applications of radiopharmaceuticals, given by several researchers from DECN/IST.

Dr. Ana Isabel Santos, from Garcia de Orta hospital, a doctor specialized in nuclear medicine, gave an invited talk about Theranostics in Nuclear Medicine from a clinical perspective. Her talk focused on the most recent developments in the field, namely on the radiotheranostics of neuroendocrine tumors and prostate cancer. Prof. Thomas Cocolios (KU Leuven) was invited to give a lecture on radionuclide production with a focus on the most relevant developments of the PRISMAP project. PRISMAP – The European medical isotope programme: Production of high purity isotopes by mass separation federates a consortium of the key European intense neutron sources, isotope mass separation facilities and high-power accelerators and cyclotrons, with leading biomedical research institutes and hospitals active in the translation of the emerging radionuclides into medical diagnosis and treatment (https://www.prismap.eu/).

The course included laboratory sessions to exemplify the several steps involved in the synthesis and evaluation of a potential radiopharmaceutical, namely ^{111}In-PSMA-617. It also comprised one-day visit, guided by Prof. Antero Abrunhosa, to the facilities of the Institute for Nuclear Sciences Applied to Health (ICNAS, Coimbra), which is the leading

institution in Portugal in the production of medical radionuclides and radiopharmaceuticals.

2.2 Course by SCK CEN

SCK CEN intends to organize a one-week online course on radiation protection in space in the second half of 2025. The course will feature lectures delivered by SCK CEN experts and possibly guest speakers from leading European organizations such as ESA, Magics, Thales, Tractebel Engie, and others.

The course could cover a wide range of topics, including but not limited to:

- Space radiation environment
- Dosimetric concepts and applications in space
- Space radiation and spaceflight health effects
- Space radiation biology
- Radiation modelling
- Space microbiology
- Introduction to space research

To avoid common challenges associated with online learning, the program will try to emphasize active engagement. Efforts will be made to foster interaction between lecturers and participants as well as among participants themselves. In addition, but depending on feasibility, the course aims to include an online technical visit or a practical session.

This course is designed for individuals with an interest in the applications of radiation protection in space. Participants should have at least a master's level education or equivalent professional experience in a relevant field.

Participants will receive a certificate of attendance after the course.

2.3 Course by UNIVLEEDS

The University of Leeds is planning to hold a course on 'Particle engineering in the nuclear industry with a focus on decommissioning' during 2025.

The course will be hybrid – with an initial online learning phase covering the basics of Decommissioning and a 1 week in-person phase allowing students to delve deeper into the area of particle technology and its relevance to the nuclear sector.

The online phase will cover:

- Introduction to decommissioning

- Decontamination and decommissioning techniques
- Decommissioning a research facility
- Decommissioning an industrial facility

The in-person phase will comprise a mixture of lectures, group work and laboratory experiments to give students hands-on experience using a range of techniques / instruments that are typically employed on nuclear sites.

All students who complete both the online and in-person training will receive a certificate.

2.4 Course by KIT

The Karlsruhe Institute of Technology is planning to hold the course on 'Innovative Nuclear Systems' during 7-10 April 2025.
The course will be held in person at KIT Campus South, and will cover some state-of-the-art topics related to innovative nuclear systems, including:

- Small Modular Reactors
- Passive Safety, Severe Accidents
- Fusion
- Nuclear Power Systems for Space Exploration
- ADS, Partitioning and Transmutation
- Fuel Cycle
- Gen IV Reactors
- Sodium Fast Reactor
- Molten Salt Reactor

The lectures will be offered by specialists from **KIT**, Gesellschaft für Anlagen- und Reaktorsicherheit (**GRS**) gGmbH, Chinese Academy of Science / Shanghai Institute of Applied Physics (**CAS/SINAP**), Japan Atomic Energy Agency (**JAEA**) and Joint Research Centre (**JRC**).

The event will comprise also a tour of fusion and sodium installations at KIT Campus North.

All students who complete the course will receive a certificate.

2.5 Course by CHALMERS

The course "Deterministic modelling of nuclear system multiphysics" was offered as planned at the end of 2023 (December 11-15, 2023).

The course deals with the modelling of nuclear reactors, with emphasis on their multi-physics and multi-scale aspects. The course covers neutron transport, fluid dynamics and heat transfer. This course aims at presenting the main algorithms in the computer codes used by the industry and in academia for the macroscopic modelling of nuclear systems. The underlying methods used in such codes, together with their assumptions and limitations, are thoroughly presented, so that the codes could be used with confidence. During the course, the participants also must implement in Matlab some of the presented algorithms to solve some practical problems of relevance for nuclear reactor simulations.

The course is a flipped hybrid course: an asynchronous self-paced online only learning phase, followed by 5 consecutive days of interactive activities (synchronous phase). The course thus consists of:

- For the asynchronous self-paced online learning phase:
    - The book titled "Modelling of nuclear reactor multi-physics – From local balance equations to macroscopic models in neutronics and thermal-hydraulics", by C. Demazière, ISBN-978-0-12-815069-6, Academic Press/Elsevier (2020) https://shop.elsevier.com/books/modelling-of-nuclear-reactor-multi-physics/demaziere/978-0-12-815069-6
      The course participants got their private copy of the book.
    - Pre-recorded lectures or webcasts available to students for on-demand viewing.
    - Online quizzes that focus on conceptual understanding.
- For the synchronous hybrid interactive sessions (online or onsite):
    - Wrap-up sessions designed to summarize the key concepts presented in the book/webcasts and to address student needs.
    - Discussions based on interactive quizzes.
    - Programming sessions, during which the attendees must solve, under the teacher's supervision and guidance, some programming assignments in Matlab Grader.

For the off-site attendees, the interactive sessions were live broadcasted on the web. They were also recorded and made available on the web.

The preparatory (i.e., asynchronous) work represents ca. 100 hours of self-studies. The synchronous interactive sessions represent ca. 60 hours.

All learning resources (book, video lectures, asynchronous quizzes, synchronous quizzes, synchronous activities) were created and uploaded on the SOUL Learning Management System used for the course. As the curriculum for the course follows the chapters in the book, the course is structured along seven chapters, as reported hereafter.

Chapter 1 – Introduction

In the introductory chapter, the main topics addressed in the book are first discussed, together with the objectives the course attempts to tackle. Areas not covered in the course are also described. The structure of the course is thereafter presented. Both the technical contents as well as the followed pedagogical approach are dealt with. The notations and conventions used throughout the course are then highlighted. Finally, some mathematical concepts and theorems of importance for the following chapters are presented. This chapter is 11 pages long in the book, to which 1 video lecture is associated.

Chapter 2 – Transport phenomena in nuclear reactors

In this chapter, the governing equations for neutron transport, fluid transport, and heat transfer are derived, so that students not familiar with any of these fields can comprehend the course without difficulty. The peculiarities of nuclear reactor systems, i.e., their multi-physic and multi-scale aspects, are dealt with. An overview of the modelling strategies is thereafter given, with particular emphasis on deterministic methods, which represent the focus area of the course. This chapter is 59 pages long in the book, to which 11 video lectures and 27 quizzes are associated. The corresponding synchronous part consists of 16 interactive quizzes.

Chapter 3 – Neutron transport calculations at the cell and assembly levels

In this chapter, the computational methods for neutron transport at both the pin cell and fuel assembly levels are presented. The chapter is aimed at following the solution procedure in fuel pin/lattice codes as much as possible. This includes resonance calculations of the cross-sections, the determination of the micro-region micro-fluxes, and of the macro-region macro-fluxes, and finally spectrum correction. The chapter ends with the preparation of the macroscopic cross-sections for subsequent core calculations, where the effect of burnup is also detailed. This chapter is 120 pages long in the book, to which 26 video lectures and 66 quizzes are associated. The corresponding synchronous part consists

of 26 interactive quizzes and 5 modelling-based assignments (all related to the development of a collision probabilities solver).

Chapter 4 – Neutron transport calculations at the core level

In this chapter, the computational methods in use for core calculations are presented. In the first part of this chapter, the treatment of the angular dependence of the neutron flux is described. In the second part, the treatment of the spatial dependence of the neutron flux is outlined. Thereafter, the solution procedure for estimating the core-wise position- (and possibly direction-) dependent multigroup neutron flux is described. Finally, the methodology used for determining the core-wise space- and time-dependent neutron flux in case of transient calculations is derived. This chapter is 58 pages long in the book, to which 15 video lectures and 35 quizzes are associated. The corresponding synchronous part consists of 13 interactive quizzes and 4 modelling-based assignments (all related to the development of a multi-group diffusion-based core simulator).

Chapter 5 – One-/two-phase flow transport and heat transfer

This chapter focuses on the computational methods used for one-/two-phase flow transport and heat transfer. From the local governing equations of fluid flow and heat transfer, macroscopic governing equations are derived, and the underlying assumptions clearly emphasized. The different flow models commonly used in nuclear engineering are introduced, models having various levels of sophistication: the two-fluid model, the mixture models with thermal equilibrium and specified drift, and the Homogeneous Equilibrium Model. The temporal and spatial discretization of the flow and heat transfer models are given special attention, with emphasis on their stability, consistence, and convergence. This chapter is 59 pages long in the book, to which 10 video lectures and 34 quizzes are associated. The corresponding synchronous part consists of 11 interactive quizzes and 2 modelling-based assignments (development of a macroscopic fluid solver and a pin temperature solver, respectively).

Chapter 6 – Neutronic/thermal-hydraulic coupling

This chapter tackles solving the coupling between neutronics and thermal-hydraulics at the core level. Various aspects of multi-physics coupling are highlighted: segregated versus monolithic approaches, coupling terms and non-linearities, information transfer, preparation of the macroscopic material data (cross-sections, diffusion coefficients, and discontinuity factors) as functions of the thermal-hydraulic variables, spatial coupling. The numerical techniques that can be used to solve multi-physics temporal coupling either in a

segregated or in a monolithic manner are also discussed in detail. This chapter is 26 pages long in the book, to which 7 video lectures and 14 quizzes are associated. The corresponding synchronous part consists of 13 interactive quizzes and 2 modelling-based assignments (development of a monolithic coupling techniques based on the Jacobian-Free Newton Krylov method).

Chapter 7 – Conclusions

The last chapter summarizes in, a nutshell, the macroscopic modelling techniques and presents a quick overview of the current efforts in high-fidelity reactor modelling. This chapter is 7 pages long in the book, to which 1 video lecture is associated.

83 persons applied for the course, out of which 50 were accepted to participate to the course (a limit of ca. 50 participants was put on the number of participants). 17 were accepted to the hybrid version of the course and 33 were accepted to the full online version of the course. Due to some last-minute registrations and cancellations, 14 persons participated to the hybrid version and 38 participated to the full online version of the course. 14 persons applied for an ENEN2Plus mobility support (group application), out of which 5 received a grant (5 was the maximum number of available grants).

The self-paced online learning phase took place between October 27 and December 8, 2023, whereas the set of interactive sessions were organized between December 11 and 15, 2023, and could be followed online or onsite. The students had to complete a minimum amount of the online self-paced work to be qualified to the interactive sessions. 31 of the participants qualified to the interactive sessions (all the 14 participants who had opted for the hybrid version of the course and 17 of the 38 participants who had chosen the full online version of the course).

To receive a certificate, the participants had to obtain a score of 50 points (out of 100 max. points) – all activities undertaken by the students were graded. All 14 onsite participants received a certificate, whereas 13 of the 17 online participants who qualified for the interactive sessions received a certificate. The participants were given one month after the interactive sessions to complete the activities if they wanted to. The course is worth 6 equivalent ECTS credits (European Credit Transfer and Accumulation System).

3 ORGANISATION OF WEBINARS AT THE UNIVERSITY OF PISA

The organisation of Webinars at the University of Pisa started early in 2021, during the Covid-19 pandemic, to cope with the lack of the usual seminars in presence, which were organised in previous times in the frame of the MSc in Nuclear Engineering of the University of Pisa, fully taught in English. The activity had a sufficient success to suggest proposing the full first series as an unplanned, in-kind contribution to the ENEN+ project running at the time.

When the ENEN2Plus project was planned, it was then decided to include in Task 3.2 the commitment of *"Organising webinars about the novelties (e.g. nuclear safety, medical application, environment, decommissioning, space, etc.) involving the companies and research centres"*. On this basis, the University of Pisa, with the help also of colleagues within CIRTEN, namely from the Università di Roma Sapienza and the Politecnico di Milano, kept proposing its offer in the frame of the new project as a valuable initiative to be performed for disseminating culture in the nuclear field. The subjects of these webinars are varied, including and going beyond the subjects suggested in the DoW.

To date two series of Webinars have been run, during the academic years 2022-2023 and 2023-2024, respectively including 20 and 33 webinars held on Friday afternoons following a well-established tradition and also the indications from the feedback received a posteriori from the attendance, via questionnaires which were distributed at the end of each series.

The activity of organising, running and evaluating the webinars has been reported yearly by the University of Pisa via detailed internal reports (Ambrosini et al., 2023; Ambrosini et al., 2024) submitted to the ENEN2Plus project Coordinator and **attached in ANNEX 1**. These reports detail the activity performed each year, including the subjects and content of the webinars, statistics about attendance and the evaluation obtained from the respondents to the questionnaires. The reader is referred to the ANNEX 1 for further details.

Actually, for the purpose of the ENEN2Plus project the name of the series was changed to "Past-student and Expert Webinars in Nuclear Energy", with respect to the old denomination "Past-student and Expert Webinars in Nuclear Engineering", still appearing in the title of the internal reports. The website of the MSc in Nuclear Engineering of the University of Pisa also reports about the webinars at the pages:

- http://nucleare.ing.unipi.it/it/webinars/webinars-2022-2023
- http://nucleare.ing.unipi.it/it/webinars/webinars-2023-2024

The 2022-2023 series of webinars was also reported in an Open Access paper (Ambrosini and Cirillo, 2024) published in the Special Issue of Nuclear Engineering and Design on the 20th Anniversary of the European Nuclear Education Network, reachable at the website https://www.sciencedirect.com/special-issue/10Z86JWDZMW

In the second series related to the academic year 2023-2024, six webinars were offered in cooperation with the TANDEM project. They were also open to the attendance from ENEN2Plus. Owing to a parallel commitment of the University of Pisa in the frame of this project, focused on Small Modular Reactors included in hybrid cogeneration systems, the idea was to use the frame set up in the years for the Past-student and Expert Webinars in Nuclear Energy for hosting the initiative.

While the reader is referred to the ANNEX 1 for a detailed account of the activity, some remarks can be drawn from the experience gained so far.

- The attendance to the webinars was variable depending on the subject and the period of the year. In particular, the experience in the last series suggests avoiding too late periods in early summer, as June. The synergy with the TANDEM project in some cases granted an unusually higher attendance.
- The choice of Friday afternoon to deliver the webinars is confirmed by the evaluation received from the attendance.
- The evaluation by the attendants of the initiative for both years was quite positive, with suggestions being provided for the subjects to cover in the future.
- The recording of webinars, made available at the above-mentioned pages of the MSc in Nuclear Engineering of the University of Pisa, constitutes an interesting and important library of webinars to be attended also in asynchronous way.

It is the intention of the University of Pisa to possibly proceed with the initiative also in the current academic year, starting only with March 2025, owing to conflicting commitments, including a Career Event organised and run in the frame of WP2 of ENEN2Plus, which absorbed available human resources, and a Symposium on SCWR reactors planned for the beginning of February 2025 (not related to the ENEN2Plus project).

4 SCIENTIFIC BULLETIN

The compiling of online scientific bulletins, introducing each nuclear professions and technological novelties is a very important part of the ENEN2plus project. This action is aimed to enhance the visibility of all our actions and reach the students, researchers, universities, our partners, the industry and the general public with new information about the different fields of nuclear science.

The Budapest University of Technology and Economics is responsible for publishing the bulletin, inviting authors, collecting articles and technical editing. The editorial board of the bulletin has 5 members, who regularly participate in compiling the content of the publications, checking the manuscripts and approving the publication.

The Editorial board is composed by:

1. Walter AMBROSINI, Full Professor in Nuclear Plants at the University of Pisa, Italy;
2. Roberta CIRILLO, working as Project Manager and Communication Officer at ENEN; after 1st March 2024 she was replaced by Gabriel PAVEL executive director of the ENEN;
3. Csilla PESZNYÁK, Medical Physics and Radiation Protection Expert in Budapest University of Technology and Economics and at National Institute of Oncology, Hungary;
4. Štefan ČERBA, who graduated from the Slovak University of Technology in Bratislava (STU) in the degree course nuclear engineering;
5. Enikő KOSZTA is a PhD student in Budapest University of Technology and Economics. She is the technical editor of the ENEN2Plus Bulletin.

Three issues are published each year; four numbers have been published to date. The publication of the fifth bulletin is in progress at the time of writing, and the sixth issue is now being prepared. The issues of the bulletin are published on the ENEN2plus website, the ENEN website and various social media platforms. Links to the relevant page and issues are reported below:

https://www.enen2plus.eu/documents

https://enen.eu/wp-content/uploads/2023/09/ENEN2plus_Bulletin_1_2023.pdf

https://enen.eu/wp-content/uploads/2023/09/ENEN2plus_2nd_Bulletin_2023_final.pdf

https://enen.eu/wp-content/uploads/2023/12/ENEN2plus_Bulletin_3_2023.pdf

https://www.enen2plus.eu/fileadmin/user_upload/ENEN2plus_Bulletin_4.pdf

ANNEX 2 reports a copy of the first Bulletin issue.

5 CONCLUSIONS

The activities reported in this document for Task 3.2 show the present status of deployment of the decisions taken in the early meetings that were organised at the end of 2022 and at the beginning of 2023, to plan for the E&T actions envisaged by the DoW of the ENEN2Plus project.

Since this report is due by M30 in the project while the actions of the task are spread over the M1 to M48 period, some of the planned activities have been already performed (two one-week courses), others are in progress (i.e., the Bulletin and the webinars) and additional others are being planned.

Overall, the collected information provides the picture of a lively task, in which many interesting activities are being performed for E&T in the nuclear field, in response to the present needs to spread nuclear culture especially in favour of new generations.

6 REFERENCES

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W. Ambrosini, R. Lo Frano and N. Forgione, 2024, Past-student and Expert Webinars in Nuclear Engineering - 2023 - 2024 Edition, Università di Pisa, Dipartimento di Ingegneria Civile e Industriale, Pisa, August 1 st , 2024, RL 360(2024)

W. Ambrosini, R. Cirillo, 2024, Sustainable online initiatives for the dissemination of nuclear energy culture, Nuclear Engineering and Design, Volume 420, 15 April 2024, 112988, https://doi.org/10.1016/j.nucengdes.2024.112988

C. Demazière, Modelling of nuclear reactor multi-physics – From local balance equations to macroscopic models in neutronics and thermal-hydraulics. ISBN-978-0-12-815069-6, Academic Press/Elsevier (2020)

ANNEX 1 – REPORTS BY UNIPI ON TWO SERIES OF WEBINARS

Past-student and Expert Webinars in Nuclear Engineering 2022 - 2023 Edition

W. Ambrosini, R. Lo Frano and N. Forgione

Pisa, July 12th, 2023 RL 329(2023)

Funded by the European Union

ABSTRACT

This report summarises the activity carried out by the University of Pisa in the frame of the webinars held by the MSc in Nuclear Engineering (fully taught in English) in fulfilment of the Task 3.2 of the ENEN2Plus project.

The activity consisted in the organisation of a number of webinars aimed at spreading knowledge about nuclear energy and related scientific matters. While these webinars have become a tradition at the University of Pisa since the 2021 year, when they were proposed because of the pandemic ongoing at the time, presently the new series has been better customised to the needs of the ENEN2Plus project, by calling all the project beneficiaries to contribute and by "…organising webinars about the novelties (e.g., nuclear safety, medical application, environment, decommissioning, space, etc.) involving the companies and research centres".

A total number of 20 webinars were organised and held in the period from February to June 2023 (http://nucleare.ing.unipi.it/it/webinars/webinars-2022-2023), making use of the Microsoft Teams platform. The start of the series only in February was suggested by the previous organisation of a further event conceived for the 80th Anniversary of the first criticality of the Fermi Pile (http://nucleare.ing.unipi.it/it/webinars/80th-anniversary-of-the-fermi-pile-criticality) delivered in the frame of WP2 actions. As in the past editions, a key feature of the webinar series was the mixing of talks by international experts in the nuclear fields and past-students of the MSc in Nuclear Engineering of the University of Pisa; however, in this series most of the past-students were senior enough to be qualified also as experts. As a further novelty, the webinars were recorded (with a single exception), letting them available for asynchronous attendance on the MSc website.

The present report describes the experience gained and the lessons learned by running the initiative and from the final evaluation based on comments gathered from lecturers and attendants.

A number of webinars has been already planned for the next academic year, aiming to continue the initiative in the frame of the ENEN2Plus project.

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1. INTRODUCTION

1.1 Updates on the recent history of the MSc in Nuclear Engineering in Pisa

In order to introduce the delivered webinars in the context of the MSc in Nuclear Engineering in Pisa, a short description of the programme is reported hereafter, in similarity with what already proposed in a report on the webinars issued in the first edition. Since these considerations were already included in the previous report, the reader who is already aware of the related content can just focus on the updates reported at the end of this section. This holds also for part of the content of section 1.2, inherited from a previous report and updated to include new information.

The MSc in Nuclear Engineering at the University of Pisa [1] (Figure 1) has been established since the 1960s and has been maintained at high levels both in teaching and in the associate research activities through the global crises of nuclear energy following the accidents of Chernobyl and Fukushima, which resulted in two referendums that repeatedly stopped nuclear power production in Italy. At least two generations of teachers endured a hostile environment, strong of European and international connections that allowed them to continue actively contributing to the progress of the studies in Nuclear Engineering going on worldwide.

The firm inclusion of the University of Pisa, through the CIRTEN Consortium [2], in the European Nuclear Education Network (ENEN) [3] has been one of the points of strength for the MSc in Nuclear Engineering of the University of Pisa, whose faculty staff offered to the ENEN Association the presidency in the years 2013-2016. A considerable number of past-students of the MSc received the Certification of European Master of Science in Nuclear Engineering, released by the ENEN Association since 2005 (see at the link http://nucleare.ing.unipi.it/it/emsne), owing to the strict adherence of the studies in Pisa to the by-laws of the Certification and thanks to the policy of favouring MSc degree theses abroad at ENEN Member institutions to achieve the required “European dimension” of the studies. CIRTEN is a founding member of ENEN and the University of Pisa directly joined its actions in ENEN since the early times of the EU NEPTUNO Project (2004-2005), which established the EMSNE Certification. The University of Pisa is also Member of Fusenet [4], the sister network of ENEN for education in the field of nuclear fusion, and is actively participating in fusion researches in cooperation with ITER [5] and EuroFusion [6], thus enhancing the tight international links also established through numerous European and international research projects.

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Figure 1. Landing page of the MSc in Nuclear Engineering (http://nucleare.ing.unipi.it/it/)

As it is well known, in the year 2011 the aftermath of the Fukushima accident in Italy witnessed a referendum whose results were interpreted as the popular will to abandon the development of nuclear energy in our Country. This was the second referendum held in Italy referring to nuclear energy, following the one held after the Chernobyl accident in 1987. After a short period of renaissance in the interest for nuclear energy in our Country in the years 2000, this referendum determined, as an unfortunate by-product, the cancellation of the BSc in Nuclear Engineering at the University of Pisa. This decision was formally based on the momentarily lower number of enrolled students. Notwithstanding the repeated protests of the teachers in Nuclear Engineering, supported by representatives of the Italian nuclear industry and of state owned companies, as well as by the President of ENEN (at the time Prof. Joseph Safieh from CEA-INSTN), and despite the will of the university organisms, the cancellation of the BSc could not be avoided and represented a serious threat to the continuation of the studies in Nuclear Engineering in Pisa. As a matter of fact, this unfortunate occurrence resulted in line with the general wrong perception of nuclear energy as a closed issue in Italy, owing to the manipulation of undue fears against it. This attitude could and should be reversed now with better awareness of the role of nuclear energy as a key component of the future decarbonised energy mix in 2050. In this regard, the recent report by the Joint Research Centre of the European Commission on the “do no significant harm” issue has assessed the acceptability of the risks coming from nuclear energy in comparison to the ones posed by other energy production technologies, showing scientific evidence clearly supporting the decision that nuclear energy must be included in the so-called Green Taxonomy [7].

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After the termination of their BSc, the teachers in Nuclear Engineering in Pisa decided to enhance the international character of the MSc in Nuclear Engineering, strong of a very good reputation worldwide, by choosing to deliver its courses in English language. Owing to the international contacts established since decades by the vast majority of the teachers in the MSc Programme, it was relatively easy to conceive the new Programme fully taught in English. The effort for setting up the MSc taught in English language was eagerly undertaken by the younger and older generations of teachers. On the side of the students, the general opinion on this change was quite positive: the new teaching language was highly welcomed by the very high-level students enrolled at the time, which were well representing the highly qualified cohorts being graduated in Pisa every year. These students promptly understood the new opportunities granted by attending lectures in English language and by the accompanying policy of internationalisation of their studies, mainly implemented by favouring thesis internship to be made abroad at highly qualified and reputed institutions. These two actions, in fact, enhanced the already established tradition of students going abroad for thesis work, being thus launched in the international job market, where they are now covering very good positions in the nuclear community; some of their stories are reported at the webpage Past Alumni (unipi.it).

Delivering the courses in English language, in addition to provide enhanced competences to Italian students, opened the door to the enrolment of foreign students attracted by the opportunity to study at an illustrious and old institution as the University of Pisa, highly quoted internationally also for the studies in nuclear engineering. An advantage for foreign students is the fact that Italy in general and the University of Pisa in particular have a clear “welcoming” attitude, providing them with financial support (e.g., by the “Diritto allo Studio” offices of the Tuscany region and by specific welcome packages sponsored by the University of Pisa), also in consideration of the different welfare conditions between their home Countries and Italy. So, to some extent foreign students could be hosted in Italy with affordable expenses for lodging and subsistence.

As a matter of fact, the number of foreign students applying for enrolment at the University of Pisa grew considerably in recent years and for the academic year 2023-2024 the received candidatures exceeded the number of 900 at the time of writing. Of course, an accurate screening of the candidatures reduces this number to few tens of foreign students who are accepted for enrolment each year. The selection process, performed on behalf of the MSc Board by a specific evaluating committee (named CIV), tends to be quite strict, aiming at selecting the best candidates who can have good chances to be successful in a programme that is traditionally tough, though absolutely fascinating and rewarding in terms of motivations and opportunities to succeed and to find a job in Italy and worldwide after graduation.

The absence of a BSc in Nuclear Engineering in Pisa, suppressed after the Fukushima accident, compels to enrol mostly Italian graduate students coming from BSc programmes in industrial engineering in Pisa (e.g., mechanical engineering, energy engineering, chemical engineering and aeronautical engineering) and also

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from other Italian Universities. A path to enrol graduate students with a BSc in Physics has been also conceived and made active. In this aim, all the necessary "nuclear core" matters are imparted at the MSc level, thus constituting a good opportunity also for professionals wishing to be "nuclearized", i.e., to convert their competencies to the nuclear field by enrolling either in single courses or in the full MSc programme. The delivery of lectures online, as a consequence of the Covid-19 pandemic, is certainly favouring these opportunities.

As a final reflection, it can be said that the decision to deliver the courses of the MSc in English language represented a further key step in the course internationalisation. Opening the course to foreign student attendance allowed, combined with the recording of lectures that happened starting with the Covid pandemic, may allow the attendance in the distance by professionals who cannot not attend in presence. One of the elective courses, Single and Two Phase Thermal-hydraulics, has been offered online since 2018 in the frame of the ANNETTE project and is also available for external professionals upon payment of a low fee.

In summary, webinars have been conceived as a valuable contribution to the teaching in the MSc in Nuclear Engineering and to its international character, bringing to students and to the general public, always invited to attend, the live voice of experts from all around the world.

1.2 The Past-student and expert webinars: origin and purpose of the initiative

In the above described international frame in which the MSc in Nuclear Engineering has been developed, seminar cycles in English language were systematically organised since 2013 on Friday afternoons, purposely left free in the lecturing calendar. Seminars were held in the years 2013, 2014, 2015, 2016, 2017, 2018 and 2019 on an occasional basis, taking profit of the presence in Pisa of some illustrious international experts or of past-students willing to present their recent work to our present students. In these previous experiences, the planning of the webinars was mostly driven by specific occasions, sometimes a latere of important conferences held in Pisa, as in the case of NURETH-15 in 2013. The webinar modality was tried in a single case, for a lecturer who could not join Pisa, using Skype and encountering several problems with the network connections available at the time. The attendance to these seminars "in presence" was generally very limited, totalling just 10 or 20 attendants at most, with few exceptions, owing also to the difficulty in advertising and in finding the right time of delivery for not colliding with other initiatives. The webinars were mostly, though not exclusively, held in the first months of the year, up to May. The attendance of the students was in fact assured during the lecturing period from the beginning of March to the end of May 2021 and was definitely more uncertain in other ones.

In 2020, the spreading of the Covid-19 pandemic and the rush to assure a good level of distance lecturing in an emergency situation monopolised the attention of teachers; the planning of seminars was obviously considered a second order problem and was de facto postponed. In December 2020, after getting better

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acquainted with the means for broadcasting lectures in an efficient way, the idea was proposed to organise webinars having mixed lecturers, belonging to the two partially overlapping categories of ”Past-students” and “Experts” in Nuclear Engineering. The partial overlapping of the two categories stems from the fact that “past-students” mostly already became or are becoming international experts in their fields of R&D. However, the evident twofold purpose of this choice was to describe to University of Pisa students the career of their older predecessors and to provide them with a varied programme of talks by experts in the nuclear field, even in the middle of the second wave of the pandemic.

In other words, depending on the subject selected by the lecturers, the webinars were useful to BSc level students, just to understand what could be their scientific career in choosing nuclear studies, to MSc level, students, to enrich the curricular lectures with specific specialised subjects, and to PhD students as well, owing to the high level content of lectures. The idea was then considered to enlarge the attendance to whoever could be interested in nuclear matters, by advertising the events at large by social networks and freely providing the related links to join the webinars. By the way, in addition to pretty technical lectures, it was tried with good success to involve high-level persons representing institutions in the nuclear and in the general energy fields that could deliver speeches on the perspectives of nuclear energy in the present historical situation in Europe and worldwide: these lectures in fact enlarged the audience, addressing people interested in energy policy, in particular in relation to nuclear energy.

The series organised in 2022-2023 changed its name to **Past-Student and Expert Webinars in Nuclear Energy**, thus enlarging the scope with respect to the initial focus to “Engineering”. This was appropriate in the frame of the ENEN2Plus in order to extend the scope as required by the inclusion in the new project, putting the accent also on non-power applications of nuclear energy. The DoW of the project in relation to Task 3.2, in fact, suggests that the objectives of the task can be achieved also by *“…organising webinars about the novelties (e.g., nuclear safety, medical application, environment, decommissioning, space, etc.)”*. This has been borne in mind in the organisation of the webinars by searching for lecturers and subjects not only related to the power applications of nuclear energy. As it will be shown later, the evaluation of the webinars, achieved by interviewing a limited number of attendants who decided to respond to a questionnaire, has suggested further matters to be covered.

The following sections report about the organisational aspects involved in setting up the webinars and about the means of their delivery. The gained experience and the future perspectives for a continuation of the initiative will be also discussed. It can be anticipated that, very probably, the initiative will be kept for all the years of the ENEN2Plus project and even later, since it has reached full sustainability as a result of the continuing efforts made in this field. The inclusion into the ENEN2Plus project is giving to the initiative an even more international character, thus repaying the effort spent with an increased worth.

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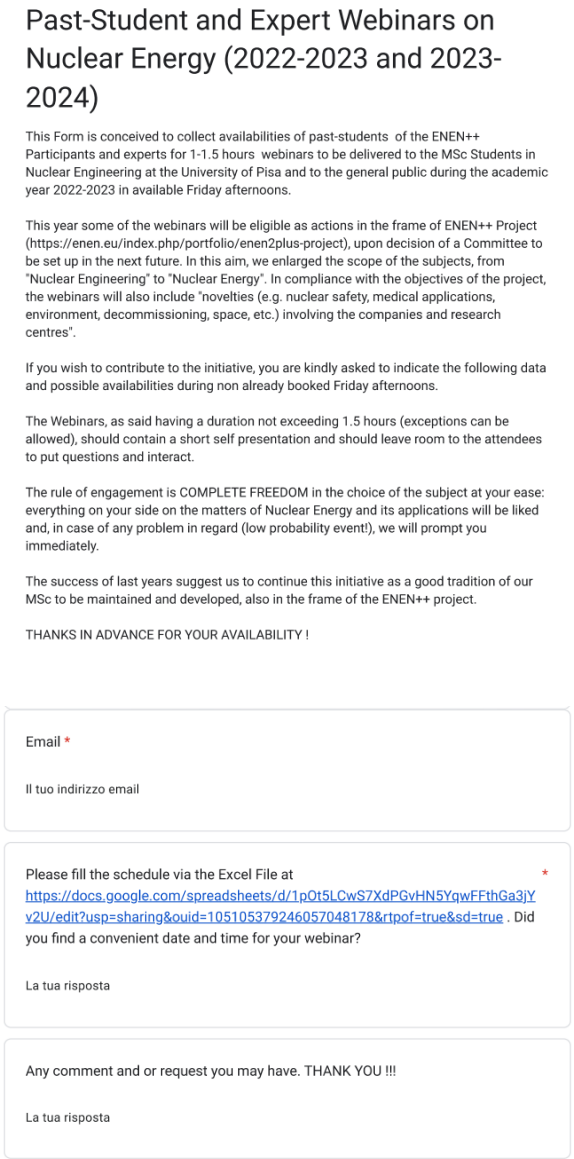
2. ORGANISING THE WEBINARS

As it was done in previous years, a first action in the organisation was establishing two Google Forms for collecting possible adhesions of lecturers and proposed attendants. In this aim, collective emails were sent to selected international experts in the nuclear fields and to past-students of the MSc in Nuclear Engineering, inviting them to propose their candidatures. Recruiting of past-students and experts went on also during webinar delivery, in order to match opportunities and needs in terms of scheduling.

The form for collecting lecturers' availability, reachable at the site

https://docs.google.com/forms/d/e/1FAIpQLSf7d6jqPxv1jQ0jTl_7-KMu4319sFQIzVJ3KFbUh9QczLdIZw/viewform

had the following content:



Past-Student and Expert Webinars on Nuclear Energy (2022-2023 and 2023-2024)

This Form is conceived to collect availabilities of past-students of the ENEN++ Participants and experts for 1-1.5 hours webinars to be delivered to the MSc Students in Nuclear Engineering at the University of Pisa and to the general public during the academic year 2022-2023 in available Friday afternoons.

This year some of the webinars will be eligible as actions in the frame of ENEN++ Project (https://enen.eu/index.php/portfolio/enen2plus-project), upon decision of a Committee to be set up in the next future. In this aim, we enlarged the scope of the subjects, from "Nuclear Engineering" to "Nuclear Energy". In compliance with the objectives of the project, the webinars will also include "novelties (e.g. nuclear safety, medical applications, environment, decommissioning, space, etc.) involving the companies and research centres".

If you wish to contribute to the initiative, you are kindly asked to indicate the following data and possible availabilities during non already booked Friday afternoons.

The Webinars, as said having a duration not exceeding 1.5 hours (exceptions can be allowed), should contain a short self presentation and should leave room to the attendees to put questions and interact.

The rule of engagement is COMPLETE FREEDOM in the choice of the subject at your ease: everything on your side on the matters of Nuclear Energy and its applications will be liked and, in case of any problem in regard (low probability event!), we will prompt you immediately.

The success of last years suggest us to continue this initiative as a good tradition of our MSc to be maintained and developed, also in the frame of the ENEN++ project.

THANKS IN ADVANCE FOR YOUR AVAILABILITY !

Email *

Il tuo indirizzo email

Please fill the schedule via the Excel File at * https://docs.google.com/spreadsheets/d/1pOt5LCwS7XdPGvHN5YqwFFthGa3jYv2U/edit?usp=sharing&ouid=105105379246057048178&rtpof=true&sd=true . Did you find a convenient date and time for your webinar?

La tua risposta

Any comment and or request you may have. THANK YOU !!!

La tua risposta

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As it can be noted, the form has been adapted also to collect availabilities for the next academic year. By the way, two of the webinars initially scheduled for July 2023 were finally shifted to the next series in order to avoid to have little attendance during the summer period, in which nearly half of Europe is on vacation in July and half in August. The linked Excel file was effective to collect availabilities in the Friday afternoons reserved to the webinars and at present time has been filled also from the beginning of October up to the beginning of December 2023.

In order to obtain first adhesions of attendants, the webinars were advertised by posting the announcement reported in Figure 2.

Figure 2. Announcement posted on social networks to advertise the series of webinars

The announcement was posted on both Facebook Pages and LinkedIn Groups. In both cases, the post was firstly posted on the pages of the organiser and then shared on other pages or groups. In particular:

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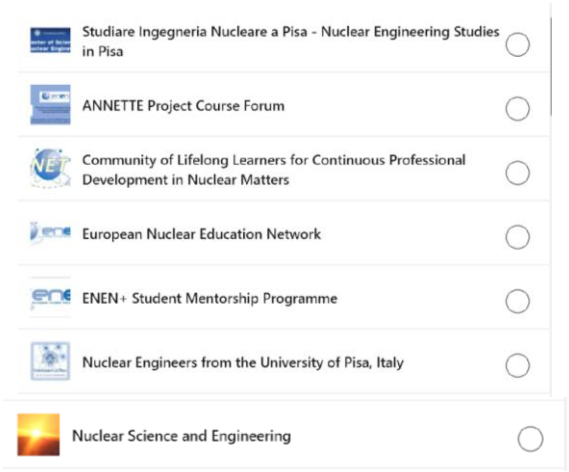
- on Facebook, the following pages were used:

- on LinkedIn, the following groups were addressed:

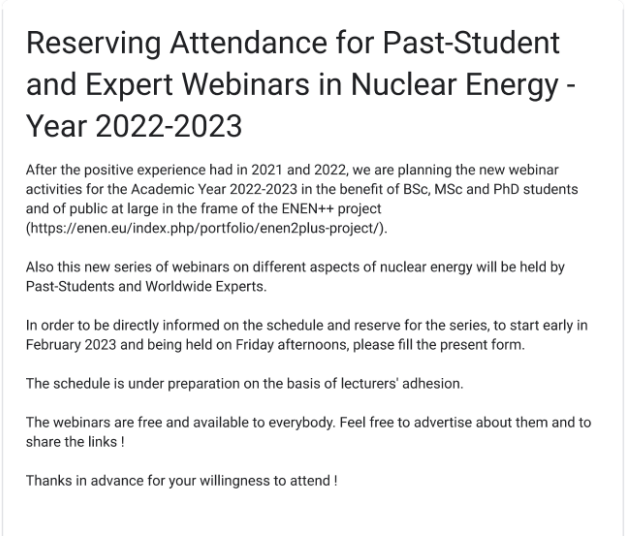


As it can be noted, the use of the pages set up in recent ENEN projects (ANNETTE and ENEN+) was made in addition to the ones set up for the MSc in Nuclear Engineering at the University of Pisa. This contributed to keep alive the interest in ENEN's activities in continuity to what done in the period of the pandemic. A direct link to Twitter was also granted by posting on the personal account of the organiser, in order to be present also on this relevant social network.

The reservations to be informed about the webinars were collected by the Google Form available at the link:

https://docs.google.com/forms/d/e/1FAIpQLSdKw2-3Nk34KaCleZUk7JJN82VJ47jqVG0eUhOsCsr_t0Sciw/viewform

The content of the form is the following:



Reserving Attendance for Past-Student and Expert Webinars in Nuclear Energy - Year 2022-2023

After the positive experience had in 2021 and 2022, we are planning the new webinar activities for the Academic Year 2022-2023 in the benefit of BSc, MSc and PhD students and of public at large in the frame of the ENEN++ project (https://enen.eu/index.php/portfolio/enen2plus-project/).

Also this new series of webinars on different aspects of nuclear energy will be held by Past-Students and Worldwide Experts.

In order to be directly informed on the schedule and reserve for the series, to start early in February 2023 and being held on Friday afternoons, please fill the present form.

The schedule is under preparation on the basis of lecturers' adhesion.

The webinars are free and available to everybody. Feel free to advertise about them and to share the links !

Thanks in advance for your willingness to attend !

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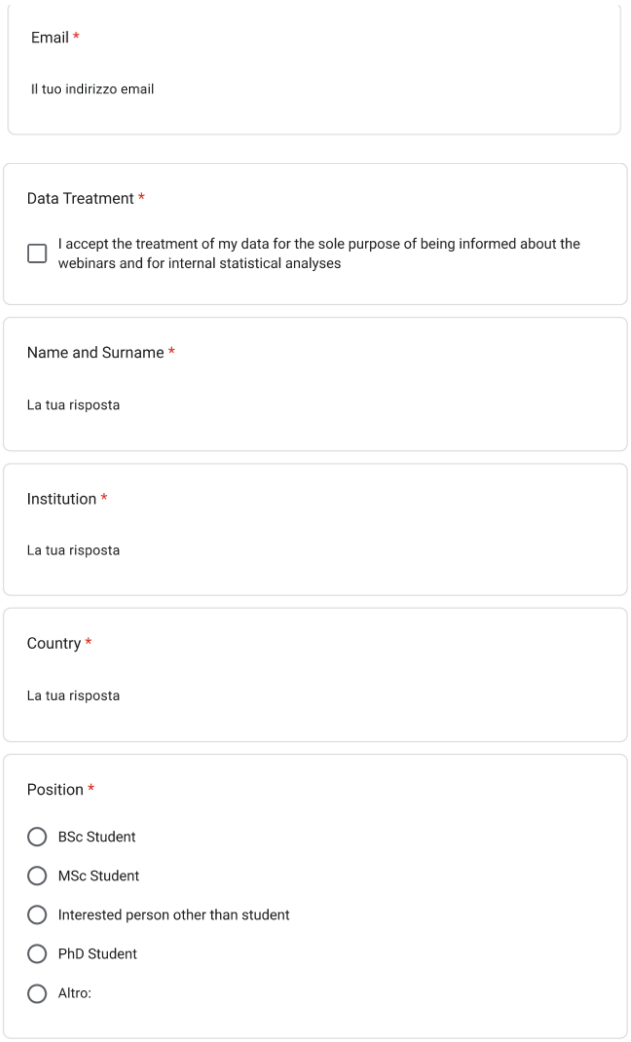

The form collected in total 156 adhesions from the following Countries: Italy, France, Nigeria, Russia, Egypt, Germany, Malta, Lithuania, India, Bangladesh, Turkey, Ghana, United Kingdom, Nigeria, Portugal, Poland, Egypt, Canada, Malawi, Mexico, UK, Morocco, Estonia, Azerbaijan, Sudan, Kenya, USA, Philippines, Deutschland, Belgium, Austria, Colombia, Finland, Romania, Senegal, Indonesia, Uzbekistan, France, India, Pakistan, Czech Republic, Greece, Brazil, Saudi Arabia, The Netherlands. The list of email addresses, collected with specific authorisation by the persons showing their interest, was then used to advertise the webinars, adding it to a broader list of possible interested persons, including the lecturers and consisting of more than 800 addresses, organised in a mailing-list named “NuclearWebinars”. The distribution by categories of the 156 contacted people is reported in Figure 3. As it can be noted, 46.2% of the reached population belong to the general public and the rest was subdivided into different categories of students at the three university levels. This confirms the capability of this kind of initiative, already noted in previous editions, to reach out and disseminate information about nuclear energy among the general public most probably constituted by scientists and researchers.

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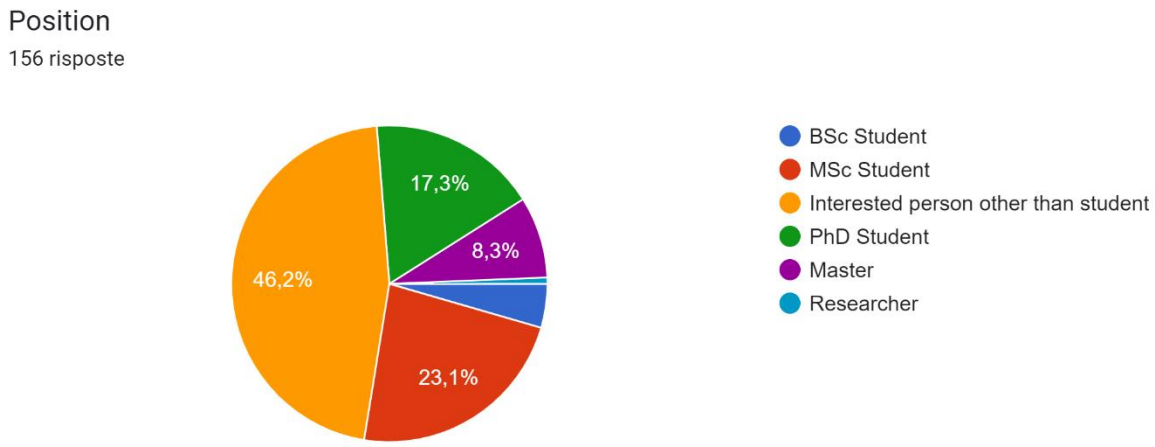

Figure 3. Distribution of reserving attendants among different categories

The distribution of the information on each one of the webinars occurred making use of the same Facebook and LinkedIn channels adopted for the initial advertising. In particular, the following systematic procedure was used for advertising each webinar:

- sending an email message to the distribution list obtained by the 156 proposed attendees who reserved by the Google Form plus the huge number of additional possibly interested persons for a total of 817 addresses; the mailing list, whose managing panel is located on the University of Pisa servers, was introduced in the present edition for making easier the distribution of information;
- posting on Facebook and LinkedIn on the pages and the groups reported above (see examples in Figure 4); as mentioned, after the first post on the pages of the organiser, the announcements were spread on multiple pages in both social networks;
- reporting the announcement of the webinar, the picture of the lecturer and his/her short CV on the website of the MSc in Nuclear Engineering in Pisa (http://nucleare.ing.unipi.it/it/webinars/webinars-2022-2023);
- sending to the communication personnel of the Dipartimento di Ingegneria Civile e Industriale, to the Unità Comunicazione Istituzionale of the University of Pisa, to ENS and to ENEN the material for advertising, in order to have further posts on the related websites (see examples in Figure 5 and Figure 6 for the websites of the DICI and UNIPI).

This communication pattern was systematically repeated for all the webinars, sending circular messages on the previous Friday late evening and sending a reminder on the morning of the day of the webinar.

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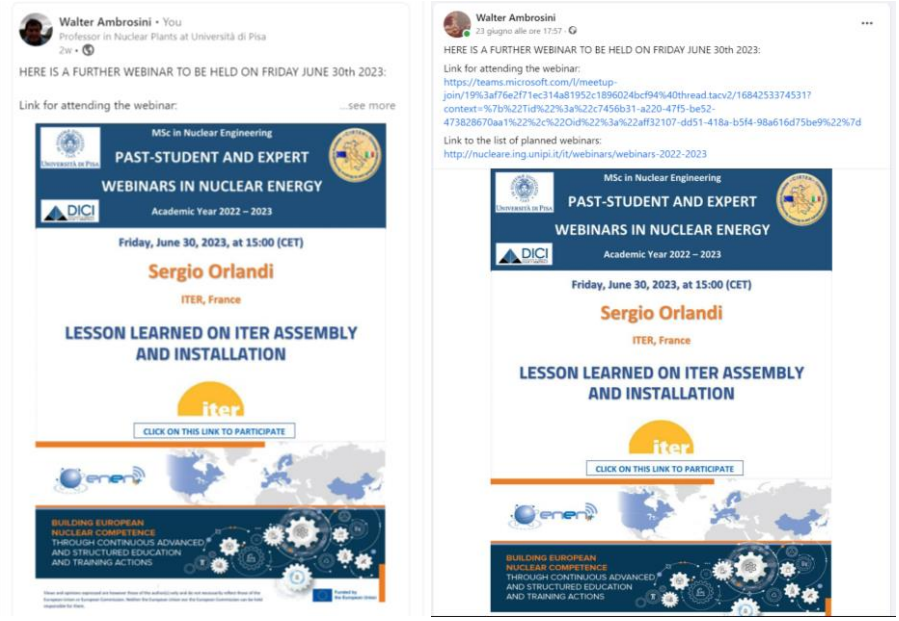

Figure 4. Announcements posted on LinkedIn and Facebook for the webinar of Ing. Sergio Orlandi

Figure 5. Announcement posted on the page of events of the Dipartimento di Ingegneria Civile e Industriale in relation to the webinar of Ing. Sergio Orlandi

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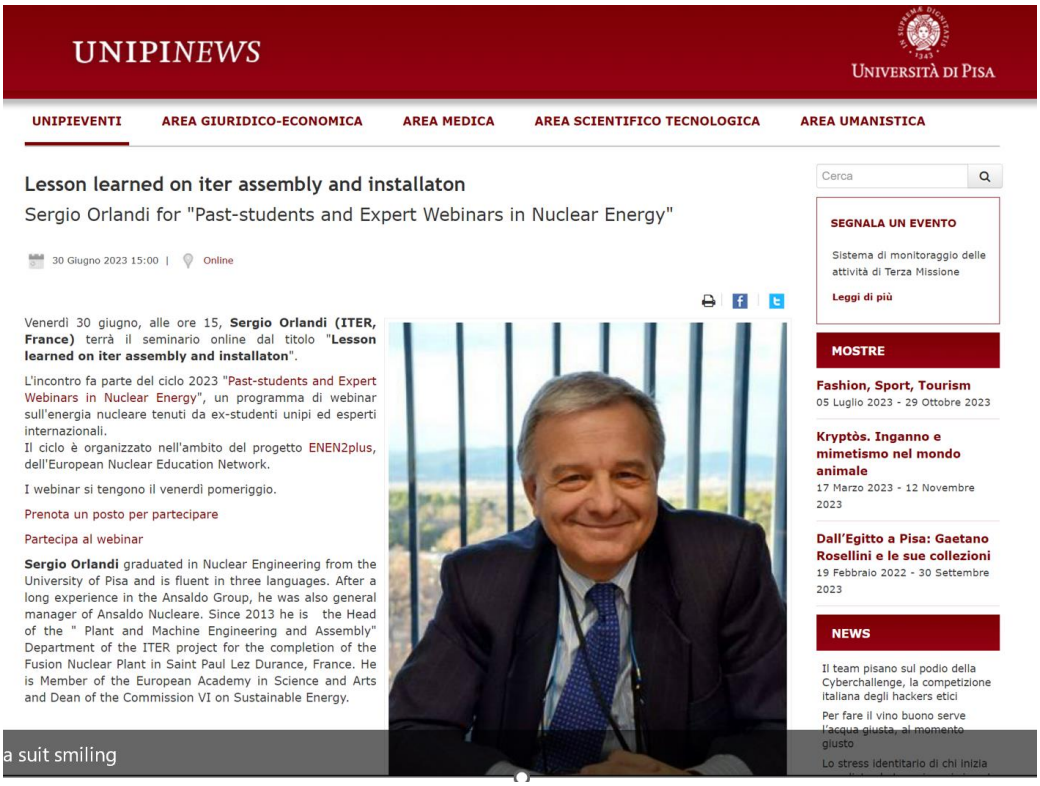

Figure 6. Internal page of the announcement posted on the website of the University of Pisa in relation to the webinar of the Ing. Sergio Orlandi

The final list of webinars, collected incrementally while the lecturers were providing adhesions, is reported in Figure 7. As it can be noted, **the involved subjects include both nuclear fission and nuclear fusion, waste management, decommissioning, space application, radioecology, medical applications of nuclear ener**gy. More general subjects related to the role of nuclear energy in the present decarbonisation process were also addressed. Lecturers came mostly from Europe, though contributions from extra-European Countries are also present.

As in the past, the criterion adopted for selecting the lecturers and the subjects was to search in the group of well reputed scientists and institutions, leaving anyway to the lecturers the complete freedom to propose the topics they found most suitable for an attendance characterized by different levels of knowledge, competences and expertise. This made easy for them to prepare the material to be proposed in the lectures, while the interest of the selected subjects for the audience was assured by their high level of expertise. Similar considerations hold for the past-students, all involved in international projects at a very high level; in their case, the interest of their talks for the present students attending the webinars consisted also in their testifying about the specific experience in finding highly qualified jobs in the nuclear field. These two ingredients were considered highly valuable: in a nutshell, the webinars brought to the students and to the external attendees the live voice of people involved in research and development in industry, research

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centres and academy. These choices, experimented in previous years, resulted useful and affective also in the present one.

LIST OF WEBINARS FOR THIS YEAR

Date (Friday)	Lecturer	Institution and Country	Starting time (Italy)	Webinar Title
10 February 2023	Gabriel PAVEL, Roberta CIRILLO	ENEN, Belgium	15:00	Supporting career paths in the nuclear fields > Recording Available
17 February 2023	Jadwiga NAJDER and Patricia SCHINDLER	ENS-YGN and Women in Nuclear	15:00	Climate science, solutions and action: nuclear technologies in support of UN Sustainable Development Goals > Recording Available
24 February 2023	Alessandro PETRUZZI	NINE, Italy	15:00	NINE R&D projects > Recording Available
03 March 2023		GENERAL ASSEMBLY OF ENEN		
10 March 2023	David NOVOG	McMaster University, Canada	15:00	The Silver Bullet Syndrome: Action and Inaction on Low Carbon Energy > Recording Available
17 March 2023	Daniel FREIS	JRC Karlsruhe, Germany	15:00	Radioisotope Power Systems for Exploratory Space Missions > Recording Available
24 March 2023	Juha POIKOLA	TVO, Finland	14:30	Olkiluoto 3 - The greatest single act for the climate in Finland > Recording Available
24 March 2023	Bogdan BUHAI	Framatome GmbH, Germany	16:00	SIMULATORS FOR VALIDATION AND OPERATOR TRAINING > Recording Available
31 March 2023	Mark ANDERSON	University of Wisconsin	15:00	UNDERSTANDING MULTIPHASE FLOW TO ADVANCE NUCLEAR ENERGY GENERATION > Recording Available
07 April 2023		MERRY EASTER VACATIONS !		
14 April 2023	Donato LIOCE	ITER ORGANIZATION	15:00	The ITER Tokamak Cooling Water System > Recording Available
21 April 2023	Sergio CIATTAGLIA	EUROFUSION	15:00	FUSION POWER PLANT COMPLEXITY AND MAIN POTENTIAL ISSUES > Recording Available
21 April 2023	Johanna HANSEN	Posiva, Finland	16:30	Spent Nuclear Fuel Management in Finland > Recording Available
28 April 2023	Mariano TARANTINO	ENEA - Italy	15:00	LFRs Overview Worldwide > Recording Available
05 May 2023	Alice D'ONOFRIO	C2TN - Portugal	16:00	Radiopharmaceuticals: How to Exploit Radioactivity for Health Applications > Recording Available
12 May 2023	Armando NAVA	Canadian Nuclear Laboratories	15:00	Fuel Bundle/Assembly Design using Subchannel Analysis > Recording Available
19 May 2023	Carlo PARISI	Idaho National Laboratory - USA	15:00	Primary Coolant Apparatus Test (PCAT): an Experimental Facility for MARVEL Microreactor
26 May 2023	Ronald SCHRAM	NRG | Pallas	15:30	The PALLAS reactor for future medical isotope production and energy research > Recording Available
02 June 2023		NATIONAL HOLIDAY IN ITALY		
09 June 2023	Shuisheng HE	University of Sheffield - UK	15:00	High fidelity simulations using DNS/LES and applications in nuclear thermal hydraulics analysis > Recording Available
16 June 2023	Mariano TARANTINO	ENEA - Italy	15:00	Space Nuclear Reactors: Status & Perspectives > Recording Available
23 June 2023	Govert de WITH	NRG|PALLAS	15:00	Radiological impact of contaminated seawater near Fukushima > Recording Available
30 June 2023	Sergio ORLANDI	ITER ORGANIZATION	15:00	Lesson Learned on ITER Assembly and Installation > Recording Available
~~07 July 2023~~	Andrea ALFONSI	Ultra Safe Nuclear - USNC	15:00	USNC for space applications: From RTG to Nuclear propulsion systems POSTPONED TO THE NEXT SERIES STARTING IN OCTOBER 2023
~~14 July 2023~~	Gianfranco CARUSO	Sapienza Università di Roma	14:00	Nuclear Desalination POSTPONED TO THE NEXT SERIES STARTING IN OCTOBER 2023

Figure 7. Complete list of the performed webinars

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Appendix A reports the announcements of the webinars, the pictures of the lecturers and their short CV, as appearing at the website of the MSc (http://nucleare.ing.unipi.it/it/webinars/webinars-2022-2023), testifying for the high level and the variety of subjects of the 20 delivered webinars.

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3. RUNNING THE WEBINARS

The Webinars were delivered by the use of the Microsoft Teams platform adopted at the University of Pisa. The tool resulted quite suitable for the purpose and the network was stable and efficient in all conditions. The features of the adopted software provided a good frame for showing the presentations of the lecturers and to allow for the subsequent discussion. A specific Team was prepared (Figure 8) and the webinar events were generated using the calendar. The generation of the events provided the .ics files to be distributed for accepting the engagement, e.g., in an Outlook calendar. The link to the webinar was generated automatically and it was used as a hyperlink both in the .pdf files of the announcement and on social networks to allow for a quick joining.

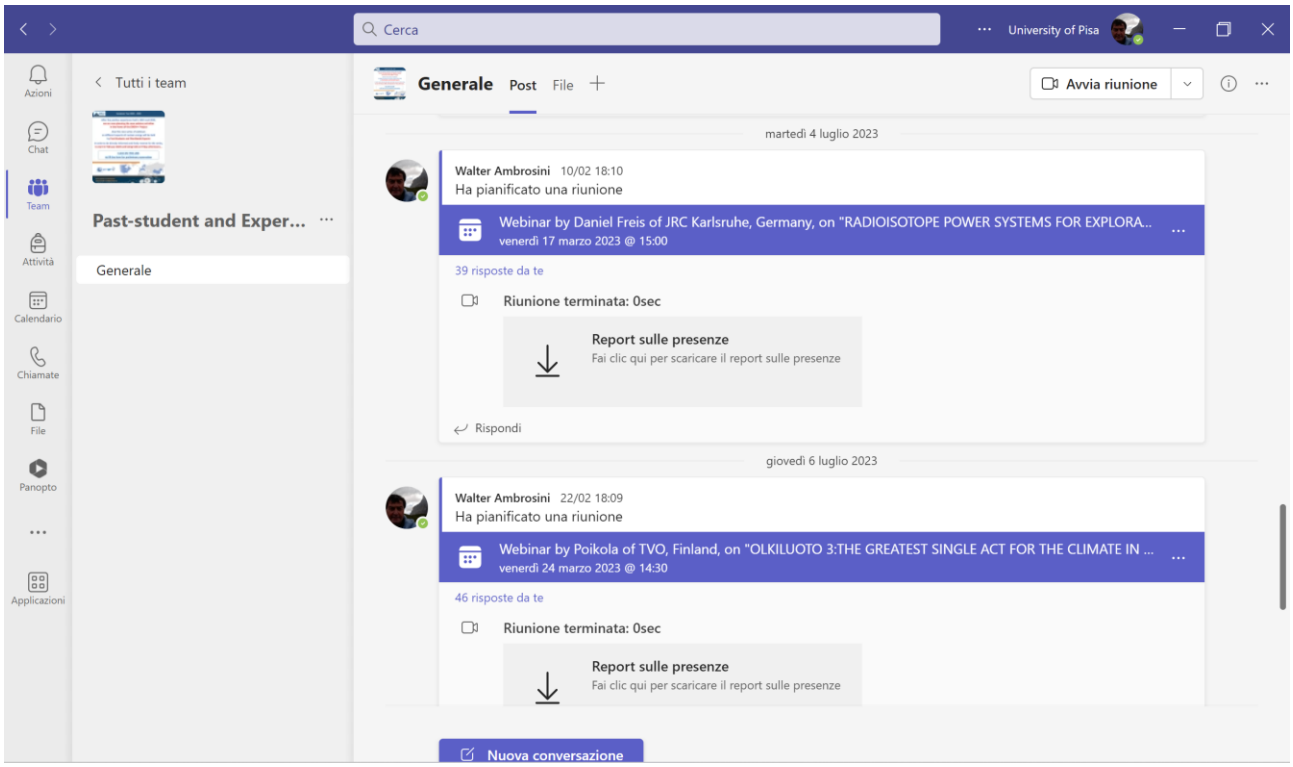

Figure 8. Team adopted for the webinars though Microsoft Teams

The duration of the webinars was variable, ranging mostly from 1 to 1.5 hours, with most of them being of about 1:10 – 1:30 hours. Questions were generally posed to the lecturers at the end of their presentations, often resulting in lively Q&A sessions.

Microsoft Teams allows to obtain reports about the attendance, providing the detail of the persons joining and exiting the Team during the period of delivery of the webinar. By periodically downloading the report, it was possible to monitor the attendance at each webinar, in terms of maximum number of attendees who connected at least for a while to the webinar. In fact, the reports show that some attendees joined and then detached from the webinar owing to their own choices or network problems. Figure 9 reports the maximum

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number of attendants for each webinar (as above specified). It can be noted that a few webinars reached very high number of attendees, also in comparison with previous editions. The first one, in particular, held by ENEN, was very broadly attended, being focused on general support to career paths, while others with a more specific subjects were understandably less attractive for a general audience. The announcement of the ENEN webinar is reported in Figure 10.

A ritual opening the microphone and clapping hands to the lecturer at the end of the Q&A was established in order to applaud the lecturer as the presentation would have been done in presence.

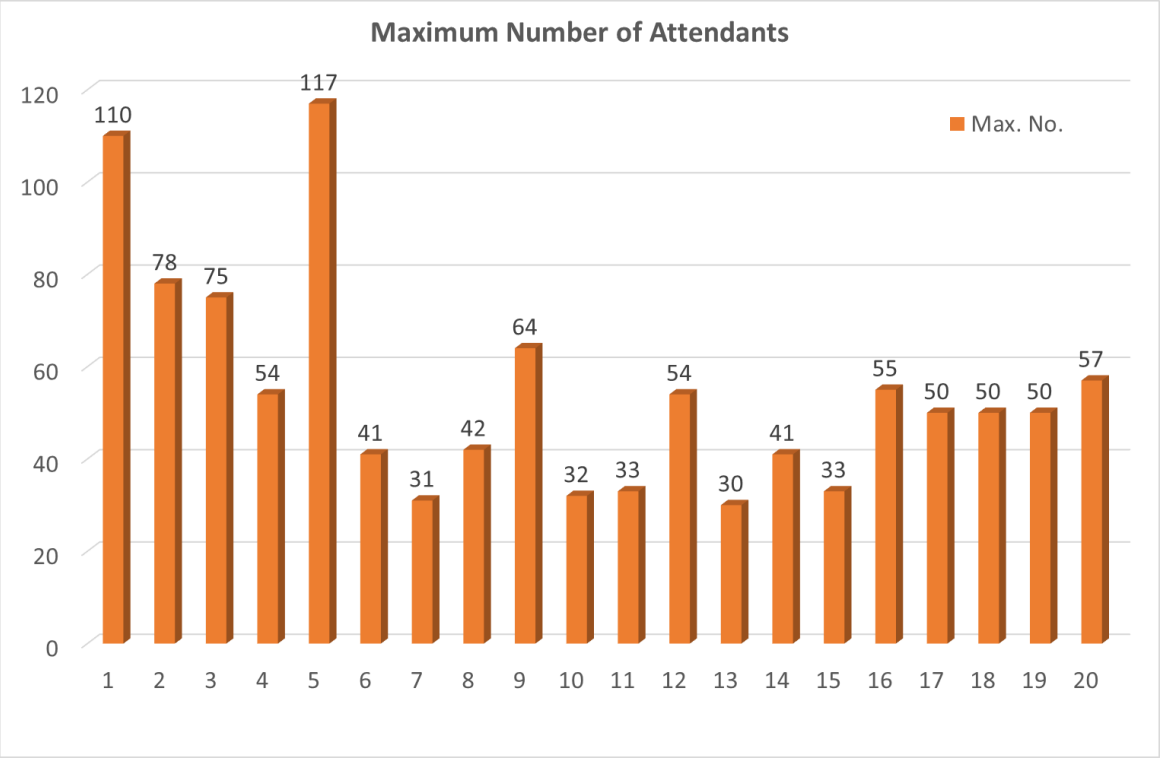

Figure 9. Total number of attendees that joined the webinars

In general terms, the webinars always had all a reasonably numerous attendance, generally higher than in previous years in which they were not included in an EU project. As it will be shown in the next section, the initiative was highly appreciated and the attendants always showed interest in their participation.

Figure 11 to Figure 12 report some of the collage posters that were used on social networks to advertise about the webinars, especially when asking for the evaluation of the initiative as described in the following section.

In terms of costs spent for the webinars, it is necessary to mention that all the lecturers adhered for free to the initiative. This is an aspect suggesting that the initiative was highly valued also by the lecturers, as an occasion to contribute with their work to spread knowledge about nuclear energy issues to an audience of interested students and researchers. This aspect will be stressed more in the next section, considering the evaluation received by a sample of attendants and researchers who responded to a specific poll.

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Figure 10. Announcement of the starting webinar by ENEN

Figure 11. Collage posters used on social networks to advertise the initiative: webinars from 1 to 10

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Figure 12. Collage posters used on social networks to advertise the initiative: webinars from 11 to 20

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4. EVALUATION OF THE EXPERIENCE IN THE YEAR 2022-2003 AND LESSON LEARNED

As in past editions, a Google Form was prepared for letting attendants and lecturers evaluate the initiative and propose suggestions for improvements. The form, available at the website

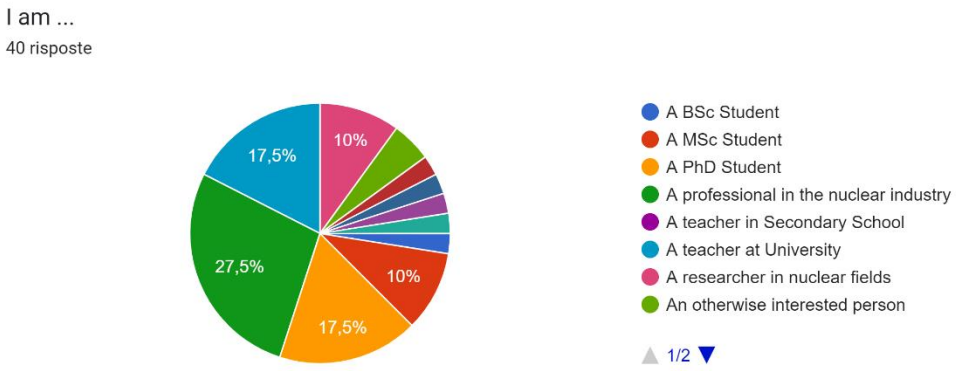
https://docs.google.com/forms/d/e/1FAIpQLSfk4VYFSDiW-oA1q9ytZdrrTVwUxBx3jKQ1CJuf708oj2eDMQ/viewform

was responded at the time of writing by 40 persons. In particular, the form had a foreword explaining tis purpose:

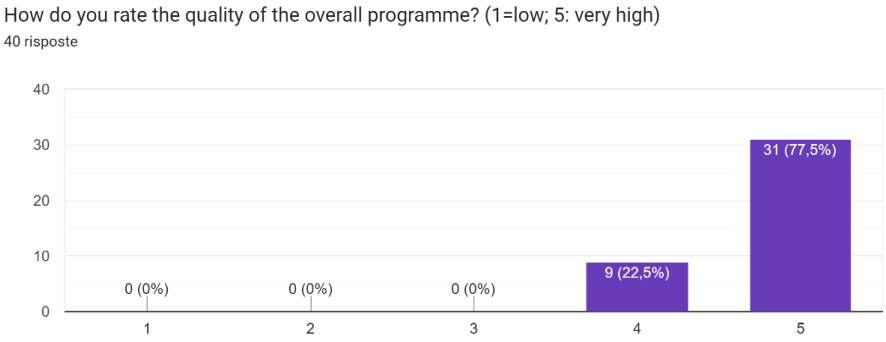
> *With this form we ask you to evaluate our webinar series. In filling the form, you will accept that your answers will be used for statistical analysis and reporting on the success of the webinars. We are not asking you evaluation of the specific webinars or of the single lecturers, but general comments on the interest of the subjects, the organisation and the possible improvements.*

The obtained answers are shortly commented below.

- The respondent was firstly asked to qualify himself/herself in a category. The obtained breakdown is reported below:



- Then the quality of the overall programme was asked to be ranked, obtaining a rather positive evaluation:



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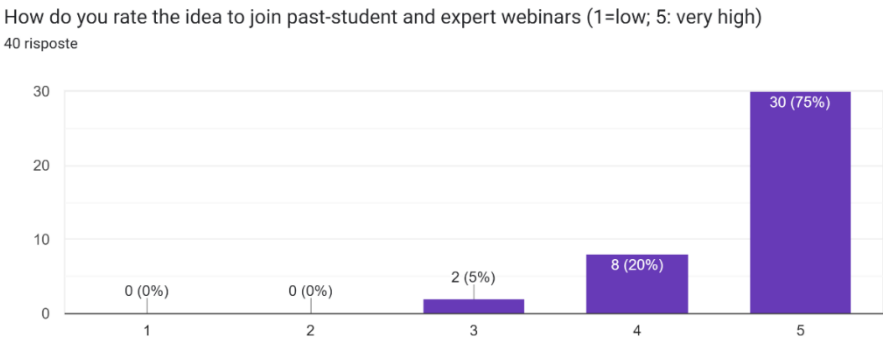
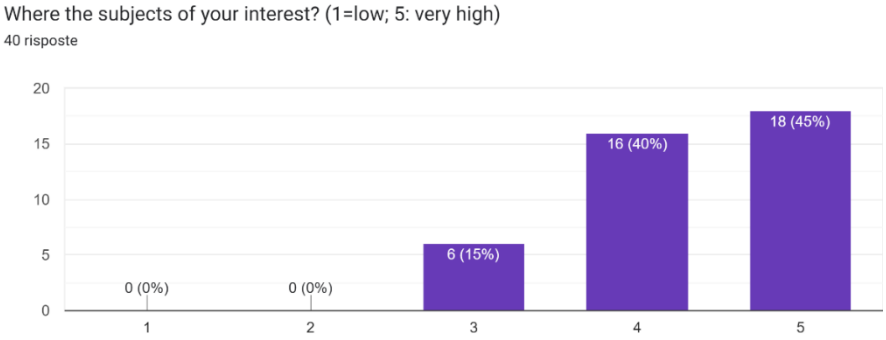
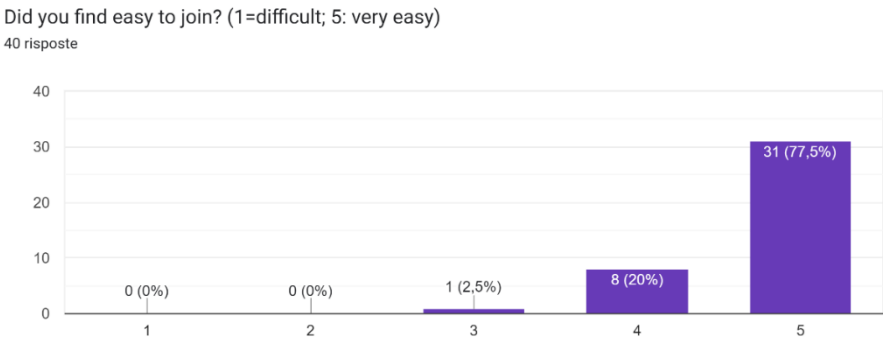
- The idea to mix past-student and expert webinars was then rated, also obtaining a high level of appreciation as in previous years:



- The interest of the subjects covered also resulted relatively high for the attendance:

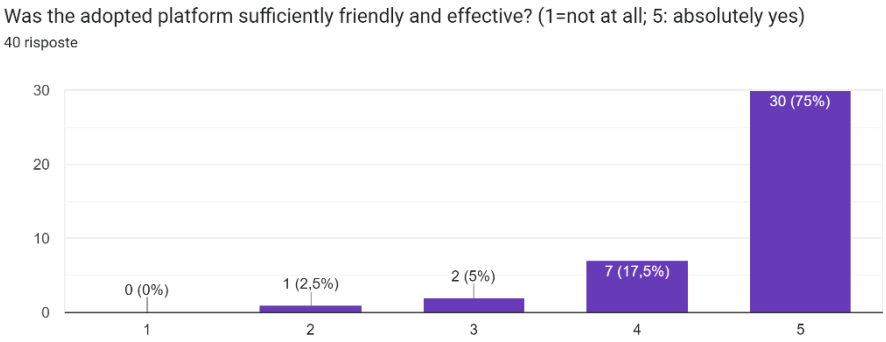


- The ease to join the webinars was also evaluated:

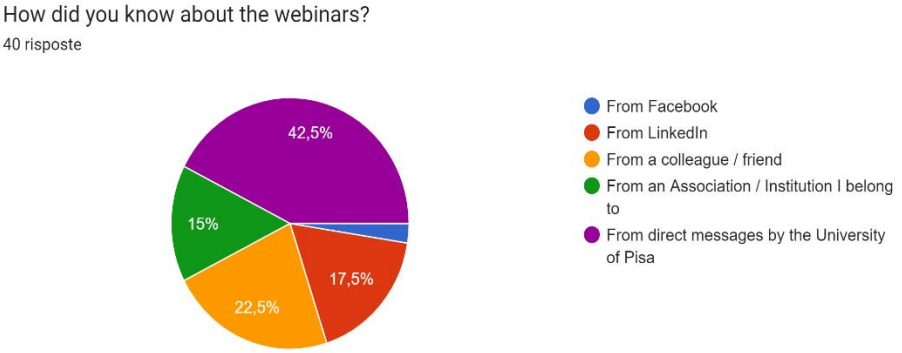


Funded by the European Union

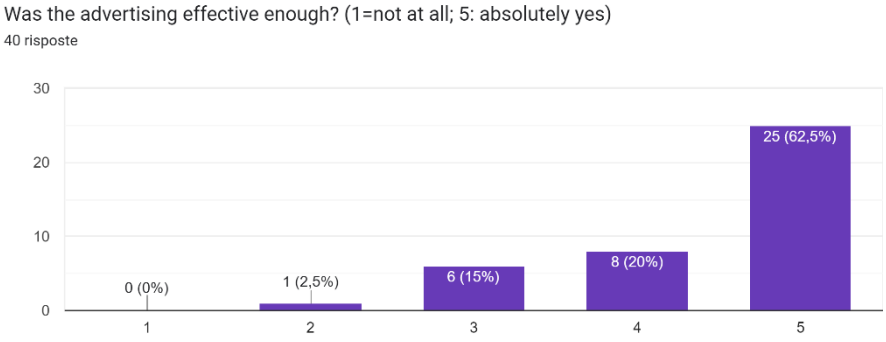
- Similarly, the adopted platform (i.e., Microsoft Teams) was considered mostly adequate to the purpose:



- The effectiveness of the advertising was also checked, providing the result, observed also in previous editions, that the use of Facebook seemingly was not very useful for the sample of respondents. LinkedIn seemed to be more effective among the social networks:



- As a confirmation of the above, it seems that the advertising, though good enough, could be improved:



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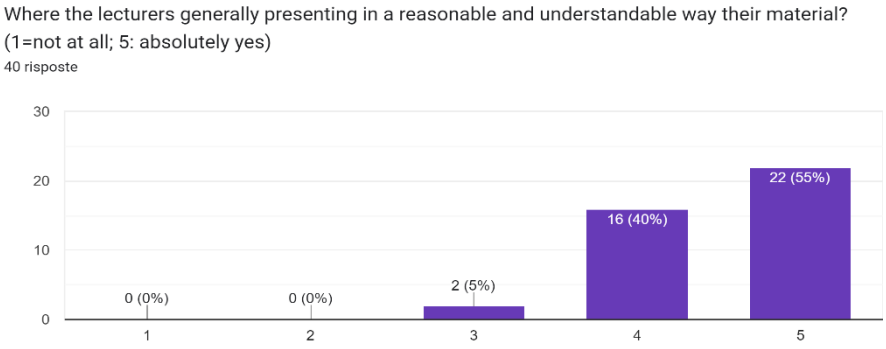
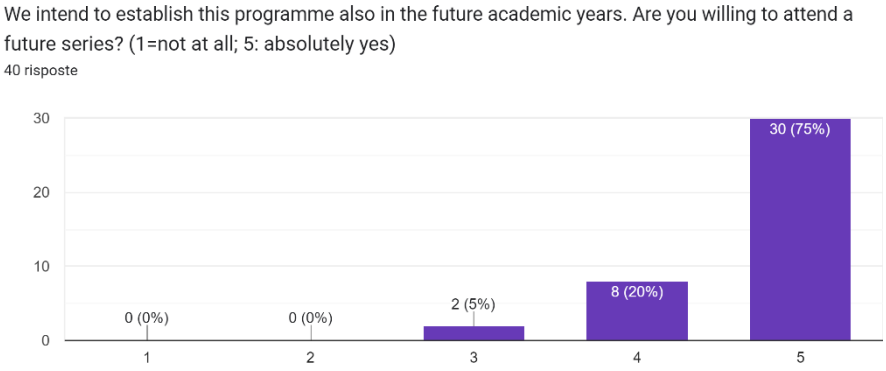
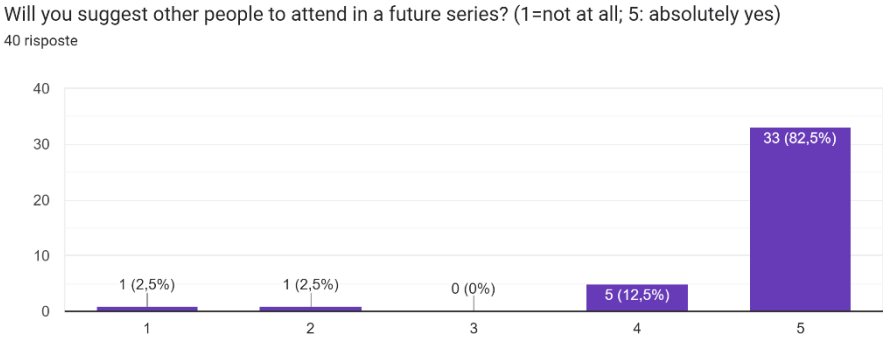
- As in previous editions, globally the lecturers seemed to be clear enough in their presentations. This is a confirmation that in the nuclear field the quality of ongoing work is definitely high, to say the least:



- The satisfaction of the attendance was checked asking about the intention to join future editions:



- A further question aimed at checking the satisfaction of the attendance got also a positive answer with some deviation to be understood:



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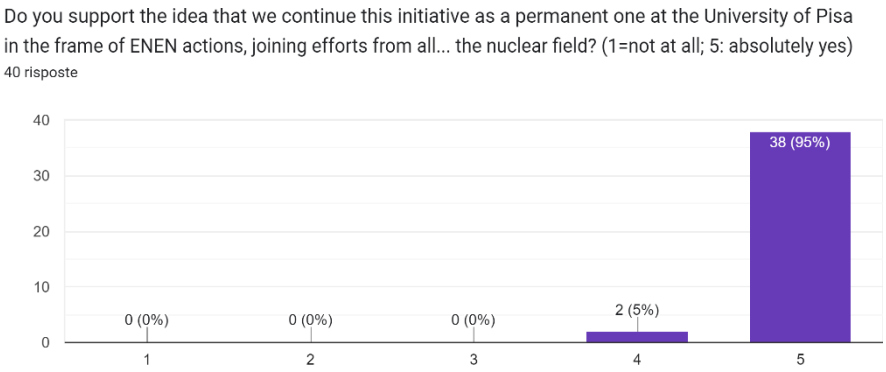
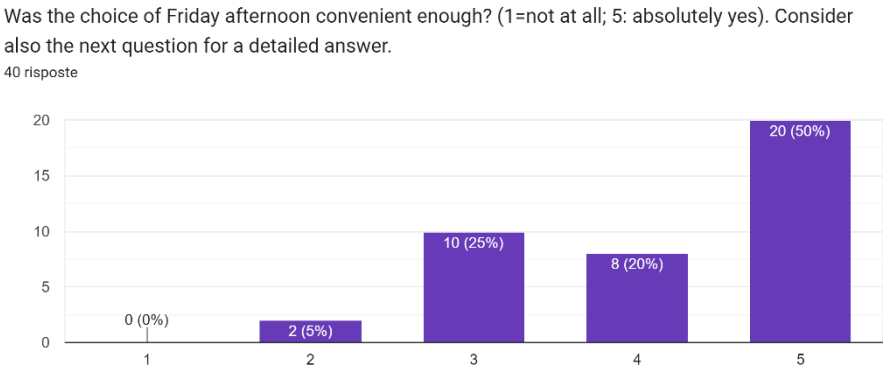
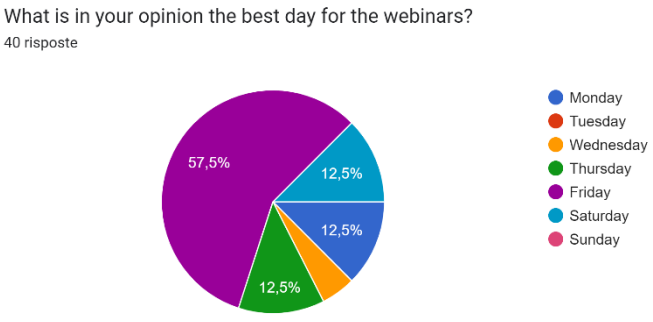
- Then, a question about the continuation of the program was proposed:



- About the choice of the day in the week, Friday seems a good choice, with some disagreement:



- A clearer question was put in this regard, having a similar result. Indeed, Friday is the best day in the week:



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- It was then asked which subjects could be considered .

Suggest future subjects and/or lecturers you would like to see in our next series:

- Nuclear accidents, Nuclear analysis methods for environmental samples
- Near miss events in Operating NPPs,, Regulatory Requirments, Gen IV reactors, Accelerators
- Radioisotopes production by nuclear applications
- Lead fast reactors and Liquid Metal thermal-hydraulics
- Developments on fusion research. Impact of nuclear energy on the environment.
- Radiation protection related topics, climate change related topics
- I would like to sé more lectures about next generation reactors
- Maybe OECD/NEA global overview of reseach
- nuclear medicine, radiation protection
- Nuclear reactor development from companies like GE, Rosatom, Tepco, or EDF
- SMR and Advanced Reactors with capacity of >= 1000MW
- For generating interest in the real work with real problems i suggest to hav eexpalnation in real working problems in integrating engineering and installation / commissioning.
- Nuclear Decommissioning, Medical applications
- Practical lectures or simulation program for operation nuclear reactor
- The lecturers that were in series, were very interesting, I would like to hear the research continuation of researchers (if, of course, they have). But your other guests, I am sure, will be no less interesting!
- SMRs, Nuclear Project Management topics, Life extension, Decommissioning
- Molten Salt Reactor and Thermal Hydraulics

- Finally, a field was left for free comments. The received ones were thirteen:

1. The presentation about release of 'water' from Fukushima mixed scientific data, explanation, graphics and reach conclusions in a way I found successful for both students, professionals and general audience.
2. Thanks for the efforts
3. Congratulations!
4. Preferirei l'orario 15-17
5. Thank you for the initiative !
6. Very nice initiative!!
7. Thank you, keep up the good works. I'm sorry for not being able to attend all the seminars because in Indonesia it is already evening and sometimes I forget about it.
8. I thank you for the shown commitment continuously.
9. Thank you for your efforts to sustain this hybrid method even after covid restrictions relaxations.
10. Thanks for your kind efforts. Hope to see you in the next series of lectures.
11. Excellent Organisation, please Keep IT for next years to come.
12. Thank you
13. Thank you very much, I am from Ukraine, I learned a lot because of these lectures! It was also nice to ask some questions to leading experts.

The feedback obtained from the responses will be attentively taken into consideration.

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5. CONCLUSIONS AND FUTURE PERSPECTIVES

The preparation and delivery of the Past-student and Expert Webinars in Nuclear Engineering by the MSc in Nuclear Engineering of the University of Pisa during the first half of 2021 can be considered a pilot experiment that was followed by two additional editions of the series of webinars, including the present 2022-2023 one delivered in the frame of the ENEN2Plus project.

With respect to the previous editions, subjects specifically suggested in the DoW of the ENEN2Plus project were addressed and an effort was made in order to make available the recordings, when allowed by the lecturers, thus starting to constitute a repository of interesting presentations about key subjects in the nuclear energy field.

The evaluation of the delivered series through a specific poll suggested that the webinars were well received by the audience and allowed to obtain useful suggestions of new subjects to be covered in the next series.

Starting with October 2023, a new series of webinars will be delivered, continuing the useful experience that was initiated by taking the chance of a more friendly attitude of lecturers and attendants towards the delivery of presentations in remote, obtained as a by-product of the remarkably challenging experience of the Covid-19 pandemic.

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ACKNOWLEDGEMENTS

The MSc in Nuclear Engineering, represented by its President, Prof. Nicola Forgione, and its Vice-President, Prof. Valerio Giusti, wishes to acknowledge the kind contribution of lecturers, past-students and international experts, who enthusiastically adhered to the initiative, providing high-level contributions, which encountered so much success as testified by the feedback received by the attendants.

The support of the European Commission through the Project 101061677 — ENEN2plus is duly acknowledged.

Funded by the European Union

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[6] Website of EUROfusion: Home- EUROfusion (euro-fusion.org)

[7] Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU), 2020/852 ('Taxonomy Regulation'), European Commission Joint Research Centre, Petten, 2021, JRC124193. https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/210329-jrc-report-nuclear-energy-assessment_en.pdf

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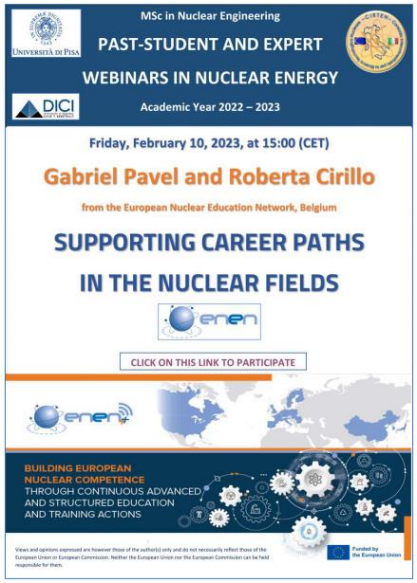
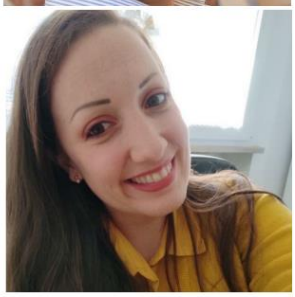
APPENDIX A – ANNOUNCEMENTS OF THE DELIVERED WEBINARS AND CV OF THE LECTURERS

Webinar by Gabriel Pavel and Roberta Cirillo on Friday February 10, 2023 at 15:00





Gabriel Pavel is currently working as Executive Director for the European Nuclear Education Network (ENEN) and also as an assistant professor at University „Politehnica" of Bucharest department of Nuclear Engineering. He finished Faculty of Power Engineering in 2004, Nuclear Power Plants and followed by a Master degree in nuclear engineering. He started working at the University in the same year and also did his PhD in the same period. During 18 years of activity he followed several specialization courses in Research Centers and Universities from Austria, Czech Republic, France, Hungary, Romania, South Korea and Slovakia. He is board member of AREN, Romanian Association for promotion of Nuclear Energy. He is involved in various projects funded by the European Commission and Cohesion funds dedicated to Human Resources and communication in the nuclear field. Since 2018 he is responsible in designing and managing E&T projects ad developing the ENEN's strategy institutions from mainly Europe but with strong connections with international organizations all over the world. He is directly involved in designing, implementing and managing actions aimed at improving nuclear competences and attracting new persons to the nuclear field in eight different projects currently under implementation. He is also managing an organization with more than 80 members from mainly Europe but also with different organizations from all over the world.

Roberta Cirillo has a bachelor in Physics from the University of L'Aquila (Italy) and a double Master of Science in Nuclear Engineering from the Polytechnical University of Catalonia (Spain) and the Polytechnical University of Grenoble (France) with a specialization in material science. She complemented her education with Energy Management and Innovation & Business Creation courses at the Management School of Grenoble. She had a multifaceted career path in which science was always the common thread and required her to live in several European countries. Starting with climate modeling data analysis for the Finnish Meteorological Institute, going on with several years of research in the field of cryogenics in CEA-Grenoble at the beginning, and later at CERN in Geneva. In parallel to her research work, she has always been actively involved in outreach activities, science communication and networking events. In 2019 she definitely shifted her career goals from Research and Technology towards the International Relations sector, focusing on education communication and outreach. Today, Roberta Cirillo works as Project Manager and Communication Officer at ENEN, which stands for European Nuclear Education Network and is the largest network in Europe for Education and Training having its headquarter in Brussels, Belgium. She is responsible for all ENEN Communication channels, manages several EU-funded projects leading the Dissemination and Communication working package and acts coordinator for the TOURR project.

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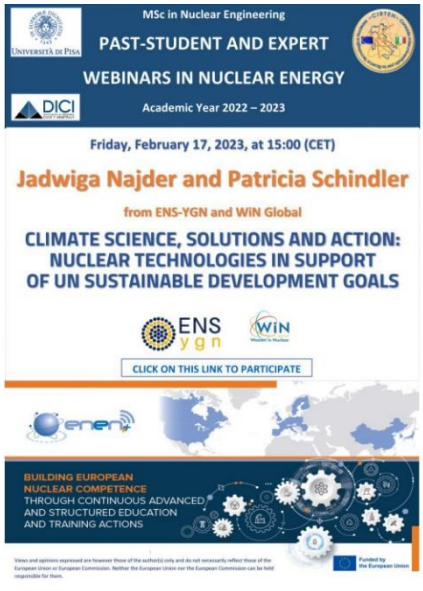
Webinar by Jadwiga Najder and Patricia Schindler

on Friday February 17, 2023 at 15:00



Jadwiga Najder is a nuclear engineer supporting a design of a NPP. As a Youth Community leader, I am also working to boost the participation of young people in the nuclear space. Passionately educating about solutions to climate change, for several years, I prepare youth and NGOs' representatives to represent nuclear at UNFCCC COP conferences. She worked as Nuclear Engineer at Oakridge SAS, France and has been Intern Engineer at CEA, Service d'étude des réacteurs et de mathématiques appliquées, Saclay, France.

Patricia Schindler worked for 35 years at the Alternative Energies and Atomic Energy Commission (CEA). Graduated with a master's degree in engineering (1985), specializing in metallurgy, she spent 5 years in a laboratory of metallurgical expertise, then turned to project management in the nuclear field. She has thus worked with multidisciplinary teams at the national and international level. She began her career in the field of sodium chemistry within FBR (Fast Breeder Reactors), before moving on to study projects concerning the PWR (Pressure Water Reactor) sector. As R&D project manager, she successively led various projects concerning the evolution of chemistry on the primary or secondary side of PWRs. These projects have led her to study, design and monitor the implementation of test facilities, combining the technique of nuclear measurements. These fields involving high temperatures and high pressures, she thus obtained in 2007 the title of expert in ThermoHydraulics in a chemical environment.

She has been actively involved since 2012 in the network “Women in Nuclear (WiN)”, as well as in various regional initiatives to promote gender equality in science and technology in order to also increase the participation of women in the nuclear sector. She joined the WiN Global Steering Committee in 2020 when she became secretary. She currently also acts as vice-president of WiN France, and leader of WiN Europe.

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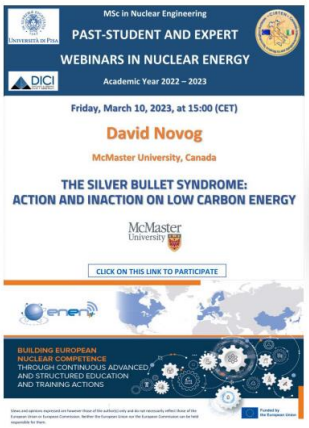
Webinar by Alessandro Petruzzi on Friday February 24, 2023 at 15:00

Alessandro Petruzzi is the President of NINE and current Head of the Plant Thermal-Hydraulics Area devoted to safety analysis and licensing of NPP.
Prior to join NINE, he worked over 9 years in the Nuclear Research Group of San Piero a Grado (GRNSPG) and he spent the year 2004 working as an intern-assistant in the Pennsylvania State University (USA).
He got his PhD Degree in "Nuclear and Industrial Safety" Course of the "Leonardo da Vinci" Doctoral Engineering School in 2008, discussing the thesis titled "Development and Application of Methodologies for Sensitivity Analysis and Uncertainty Evaluation of the Results of the Best Estimate System Codes applied in Nuclear Technology".
The methods for uncertainty and sensitivity analysis applied to thermal-hydraulics system codes constitute his main interest as well as the assessment of computer codes and the development of sensitivity and uncertainty methods.
He was involved in several activities connected with safety and licensing process, including the preparation of Chapter 15 of Final Safety Analysis Report (FSAR) of Atucha-2 NPP (Argentina), Hanhikivi-1 NPP (Finland) , the support to the Generic Design Assessment (GDA) Step-3 and 4 for the HPR-1000; the participation as expert to the Generic Reactor Safety Review (GRSR) service organized by IAEA for several NPP design (more than 10 different NPP).
He is the founder and director of the NINE Multi-Level Training Program which includes several courses organized each year and devoted to Scaling, Uncertainty and 3D COuPled Code Calculation, Models and Methods for Advanced Reactor Safety Analysis, Nuclear Reactor Safety Hand-On Training. He was involved also as expert in the Safety Assessment Education and Training (SAET) Programme of IAEA which has been designed to support IAEA Member States with development of required safety assessment capacity and competency.

Funded by the European Union

Webinar by David Novog on Friday March 10, 2023 at 15:00



Dr. David Novog is an expert in safety analysis methods and uncertainty quantification. He holds an Industrial Research Chair in Nuclear Safety and has been a professor at McMaster since 2006.

From 1998-2005 he worked at Ontario Hydro, OPG, Nuclear Safety Solutions and AMEC in the areas of reactor physics, thermal hydraulics and reactor trip assessment. Prior to these positions he was a visiting researcher at Mitsubishi Heavy Industries in Japan on their APWR project.

His current research is focused on experimental and analytic issues related to fuel integrity, severe accident modelling, and emergency planning. He has large projects underway on improved maintenance instrumentation and applied radiation imaging.

Webinar by Daniel Freis on Friday March 17, 2023 at 15:00

Daniel Freis is a Nuclear Engineer and works since 2013 as a Scientiffic Officer at the European Commission's Joint Research Centre (JRC) in Karlsruhe, where he coordinates the group for Synthesis and Characterisations within the Nuclear Materials Research unit.

Before joining JRC Karlsruhe, Daniel was working at Westinghouse Electric Germany GmbH on safety assessment of nuclear power plants and severe accident mitigation systems. He obtained his PhD degree in Nuclear Engineering from RWTH Aachen University in collaboration with JRC on severe accident behaviour of high-temperature reactor fuel.

Daniel's research is mainly focussed on safety assessment and safety testing of nuclear fuels, with an emphasis on Generation IV metal cooled and high temperature reactors, and he is responsible for JRC's activities on Radioisotope Power Systems for space applications based on Am-241 and Pu-238.

Funded by the European Union

Webinar by Juha Poikola on Friday March 24, 2023 at 14:30

Mr Juha Poikola title is Manager, Public Relations. He also works as an TVO's expert in energy and climate policy. Currently Juha is also responsible for Olkiluoto 3 communication. Mr Poikola has actively participated into lobbying for positive political decisions for Olkiluoto 3 and Olkiluoto 4. Finnish parliament made these decisions in years 2002 and 2010. Mr Poikola has worked at energy sector for 21 years. Before that he worked for forest industry.

Webinar by Bogdan Buhai on Friday March 24, 2023 at 16:00

Resume

Dr. Bogdan Buhai

born on 21.09.1977 in Dej, Romania

Education

04/1990 -09/1997 Graduate at the Technical University of Cluj-Napoca with a Master Degree. Major course of study: Applied Sciences – Physical Engineering.

Professional activity

12/2001 – 03/2007 **University of Ulm, Germany**
Scientific employee at the Division for Nuclear Magnetic Resonance, University of Ulm, Germany. PhD Thesis: „ Electrohydrodynamic investigations of fluids in complex systems by NMR mapping experiments and computer simulations ".

since 4/2007 **Framatome GmbH**
1/2007 – 06/2012 **Training Center Offenbach**
Referent by AREVA NP GmbH
Development of the training concept for classroom trainings
Experience in co-founded EU Educational Projects
Invited EU expert for development of a Job Taxonomy for Nuclear Industry

06/2012 – 06/2014 **OL3 New Build Construction Site**
Project Leader OL3 Simulators with following activities:
- Specification of Training Requirements for Training Simulators and Tools
- Development of Validation and Verification Programs for Training Simulators
- I/O Interfaces, Process Oriented Simulations and Tools
- Development, Implementation and Evaluation of Training Programs with Simulator

07/2014 – 6/2016 **Training Center Offenbach**
Deputy of Training Center Department and Simulator Expert

7/2016 – 11/2016 **OL3 Construction Site**
Project Leader OL3 Simulators with following activities:
-Simulator Validation and declared Ready for Training on 15.10.2016.

12/2016 - now **Training Center Framatome GmbH Karlstein**
Deputy of Training Center Department and Simulator Expert
Project Leader OL3 Simulators for last phase after FLG
Training Manager at FRAMATOME Training Centre
Qualified Trainer for EPR Technology

Major Areas of Interest: Nuclear Power Plant Simulators for Licensing of Operators
Training Methods and Methodology in Nuclear Training

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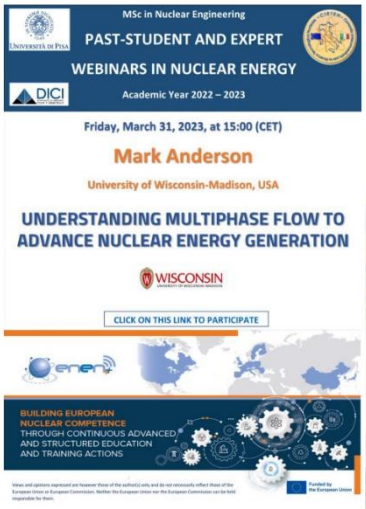
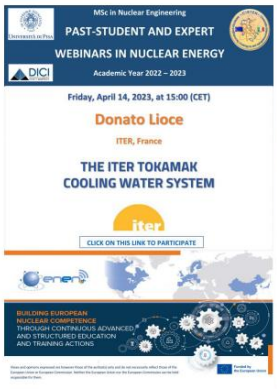
Webinar by Mark Anderson on Friday March 31, 2023 at 15:00



Mark Anderson is the Consolidated Paper Associate Professor in the Department of Mechanical Engineering at the University of Wisconsin – Madison and Director of the University of Wisconsin's Thermal Hydraulic Laboratory. Dr. Anderson studies physics, thermal-hydraulics, and, material corrosion issues related to several different fluids (salts, liquid metals, SCW, sCO_2) related to energy production and storage. He is currently the U.S. representative to the International Atomic Energy Agency (IAEA) for the coordinated research project on supercritical fluids and has active research on sCO_2 Brayton cycle for nuclear, solar, and fossil advanced power generation. He has been awarded five patents and has published over 150 journal papers in various areas related to energy production and utilization, fundamental physics, and materials.

Webinar by Donato Lioce on Friday April 14, 2023 at 15:00



Donato Lioce has a PhD in Nuclear Engineering with a thesis on 'Pre-operational Tests and Design Basis Accidents Simulations for a Generation III+ Nuclear Power Plant'. He leads the Tokamak Cooling Water System Section at ITER (ww.iter.org), having the responsibility to design and manufacture the primary cooling system of the ITER fusion reactor. Before joining the ITER organization, he worked in Ansaldo Nucleare S.p.A. on many projects spanning from service to operating nuclear stations to design of gen. IV reactors, and, before that, he worked for Westinghouse Electric Company on generation III+ reactors.

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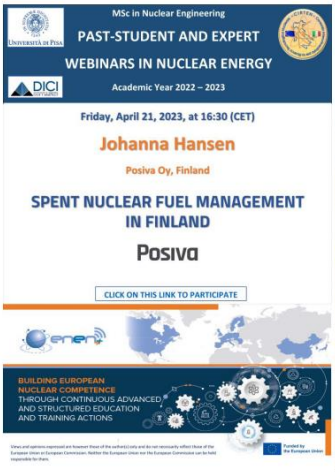
Webinar by Sergio Ciattaglia on Friday April 21, 2023 at 15:00

Sergio Ciattaglia is an Electrical Engineer, graduated in 1973. After 3 years in the railway company (operation and maintenance of electrical and safety systems) and a year (1977) at Pisa University for a course on Nuclear Safety and Radioprotection, he worked for 12 years on the licensing of Italian NPPs. Since 1990 he is working in nuclear fusion field: safety analysis of NET, Director of Frascati Tokamak Upgrade (94-98) and manager of ENEA R&D activities. Since 2000 he moved abroad, first at JET, on operation and maintence, than on ITER licensing (7 years at Cadarache) and from 2014 on EU-DEMO safety analysis, plant electrical system and integration, in the design central team of EURO-fusion in Garching.

Webinar by Johanna Hansen on Friday April 21, 2023 at 16:30



Johanna Hansen

Olkiluoto, 27160 Eurajoki, Finland Posiva Oy – Eurajoki, Finland, R&D Coordinator, 2002 to Present
Posiva Oy, - Loviisa, Finland, Site Field Manager/Geo Research Assistant, 10/1997 to 2/2002

- Dedicated and highly motivated nuclear waste management professional with career-long history driving planning and execution of complex projects focused on cutting-edge research and development for safe nuclear fuel disposal. Lead and mentor teams in producing exceptional results under tight deadlines and in conformance with stringent engineering requirements.
- Currently Secretary General for IGD-TP (Implementing Geological Disposal – Technology Platform) 2022-2023
- Co-ordinated Euratom's FP7 DOPAS project from 2012 to 2016 (budget up to 16 M€).
- Subproject manager for the disposal system demonstration with prototype machinery in real conditions Full Scale In-Situ System Test (FISST) and Project manager for EBBO (Engineered Barrier Behaviour in ONKALO)

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- Project manager for Disposal Facility Closure project Oversee project planning, schedule development, milestones, deliverables and budgets. Manage performance of teams, ensuring consistent alignment with requirements to achieve goals and deliver high-quality results..
- Developed low pH cementitious materials and backfill and closure subsystem for KBS-3 concept at Olkiluoto, including field supervision of underground installation.
- Selected as task force leader for WP4 Task 4.1 as part of Horizon 2020 project, Modern 2020.
- Supervised site characterisation investigations like core drilling, groundwater measurements, sampling and workflow for site investigations at Hästholmen. Contributed to EIA process and communicated with stakeholders at the municipality level.

Webinar by Mariano Tarantino on Friday April 28, 2023 at 15:00

Dr. Mariano Tarantino, ENEA. Mariano Tarantino got is PhD degree in “Industrial and Nuclear Safety Course” of the “Leonardo da Vinci” Doctoral Engineering School in 2008, discussing a thesis work on “Experimental Investigation of the Thermal Hydraulic Behaviour of Heavy Liquid Metal Cooled Reactors”.

From November 2010 to December 2018 he acted as Scientific Advisor of Gen. IV R&D domain in the frame of the Research Program Agreement (ADP) between ENEA and Italian Minister for the Economic Development (MiSE).

Mariano Tarantino has been involved in heavy liquid metal technology development since 2003, leading numerous programs at national and international level. In this frame, he worked on heavy liquid metal heat transfer, prototypical components design, operation and experimental characterization of innovative solutions for LFRs, experimental infrastructures implementation, coolant chemistry assessment and material development and qualification.

Mariano Tarantino is also a member of the FALCON Consortium for the ALFRED (DEMO LFR) promotion, design, construction and operation in Romania. Specifically, he is responsible of the RD& Qualification Task Force in FALCON.

He is author of more than 50 papers in international journals and more than 80 papers in peer-reviewed international conferences.

Presently he is the Head of Nuclear Safety, Sustainability and Security Division in the Department of Fusion and Technologies for Nuclear Safety and Security, ENEA.

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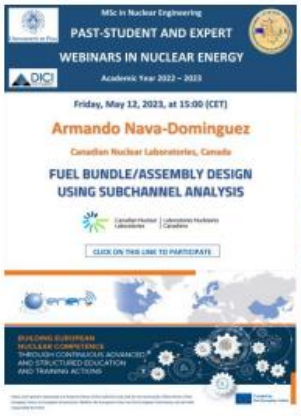
Webinar by Alice D'Onofrio on Friday May 5, 2023 at 16:00

Alice D'Onofrio worked in several Medicinal Chemistry and in Organic Synthesis projects in different European research groups before starting a PhD in Radiochemistry at the Center for Nuclear Sciences and Technologies (C2TN/IST) of the Instituto Superior Técnico of Lisbon. Her PhD research, carried out within the Marie Curie Innovative Training Network MEDICIS-Promed, focused on the development of clickable radiocomplexes for cancer theranostics. She has been involved in the development and pre-clinical evaluation of several radiolabeled compounds (antibodies, peptides, nanoparticles) directed at biological targets relevant for oncological applications (GRPr, TEM1, NKR1). Currently she is working as a post-doctoral researcher in the Radiopharmacy Lab of the Inselspital at the University of Bern.

Webinar by Armando Nava on Friday May 12, 2023 at 15:00



Armando Nava Dominguez has a Bachelor's degree in Energy Engineering, specialized in Nuclear Thermalhydraulics and a Master's degree in Nuclear Thermalhydraulics. He joined CNL in 2005 as a Thermalhydraulics Analyst, specializing in code development and validation of the subchannel code ASSERT-PV. He joined the Canadian Super Critical Water Reactor (SCWR) team in 2011 as part of the Generation-IV International Forum (GIF) program. He is the Canadian member and co-chair of the SCWR Thermalhydraulics and Safety under GIF. At CNL, he is the Technical Lead of the SCWR Gen IV project, and Head of the Advanced Reactor Technologies section. In addition, he has five years of experience in the private sector conducting deterministic and probabilistic safety analyses of nuclear power plants.

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Webinar by Carlo Parisi on Friday May 19, 2023 at 15:00

Carlo Parisi is a scientist with over 19 years of experience in academics and government laboratories. In 2004 he got a M.Sc. and in 2008 a Ph.D. in Nuclear Engineering at University of Pisa, Italy. His area of expertise includes thermal hydraulics, neutronics and uncertainty quantification. Since October 2015 he is a scientist at the Idaho National Laboratory, USA. His current activities include thermal hydraulic design/analysis and uncertainty quantification for several projects: MARVEL Microreactor, Thermal Test Reactor Capabilities, TREAT Sodium Loop Experiment, Light Water Reactors Sustainability. He is member of the INL RELAP5-3D code development team. He is member of the American Nuclear Society since 2004.

Webinar by Ronald Schram on Friday May 26, 2023 at 15:30

Ronald Schram has studied physical chemistry at the University of Amsterdam. In 1994 he acquired his Ph.D. on statistical mechanics and fluctuation theory, applied to fast and slow sound phenomena in binary gas mixtures. In that same year he started to work in Petten, studying thermochemical properties of nuclear materials. He spent almost 30 year of his career in various positions in research, operation, and management, both in the nuclear energy and nuclear medical domain. He is closely involved in the PALLAS reactor project, from the first initiative in 2003, until now. In his current role as Director Strategic Alliances of NRG|PALLAS, Ronald is involved in the international and national networks on nuclear knowledge infrastructure, both for energy and health. He has a strong interest in practical applications and the positive societal impact of nuclear, recognizing the importance of nuclear knowledge and training. The presentation will outline the role of research reactors in nuclear medical production and R&D for energy and health, and the underlying principles of irradiation technology. The deployment of the PALLAS reactor for future nuclear medical production and energy research will be highlighted in the webinar.

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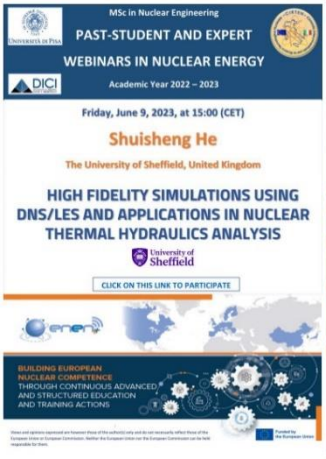
Webinar by Shuisheng He on Friday June 9, 2023 at 15:00



Shuisheng He is Chair in Thermofluids in the Department of Mechanical Engineering at University of Sheffield, UK, and a chartered engineer (CEng) and Fellow of the Institution of Mechanical Engineers (FIMechE). After completing his PhD in the Nuclear Research Group at University of Manchester, he spent over three years at British Energy (now EDF Energy) as Core Heat Transfer Analyst, before starting his academic career in 2002. Shuisheng's research focuses on turbulence and nuclear thermal hydraulics. The latter includes modelling for liquid-metal, supercritical-water and gas-cooled reactors using high fidelity DNS and LES as well as conventional RANS CFD. His group has developed several in-house CFD codes including a DNS/LES package CHAPSim. They have also developed a new concept coarse-grid CFD referred to as Sub-channel CFD. Their research interest has recently extended to fusion thermal hydraulics. He is Leader of UK Fluids Network Special Interest Group (SIG) in Nuclear Thermal Hydraulics (https://fluids.ac.uk/sig/Nuclear), and Chair of the Collaborative Computational Project in Nuclear Thermal Hydraulics (https://ccpnth.ac.uk/), and routinely provides expert review and consultancy for EDF Energy.

Webinar by Mariano Tarantino on Friday June 16, 2023 at 15:00

Dr. Mariano Tarantino, ENEA. Mariano Tarantino got is PhD degree in "Industrial and Nuclear Safety Course" of the "Leonardo da Vinci" Doctoral Engineering School in 2008, discussing a thesis work on "Experimental Investigation of the Thermal Hydraulic Behaviour of Heavy Liquid Metal Cooled Reactors".

From November 2010 to December 2018 he acted as Scientific Advisor of Gen. IV R&D domain in the frame of the Research Program Agreement (ADP) between ENEA and Italian Minister for the Economic Development (MiSE).

Mariano Tarantino has been involved in heavy liquid metal technology development since 2003, leading numerous programs at national and international level. In this frame, he worked on heavy liquid metal heat transfer, prototypical components design, operation and experimental characterization of innovative solutions for LFRs, experimental infrastructures implementation, coolant chemistry assessment and material development and qualification.

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Mariano Tarantino is also a member of the FALCON Consortium for the ALFRED (DEMO LFR) promotion, design, construction and operation in Romania. Specifically, he is responsible of the RD& Qualification Task Force in FALCON.

He is author of more than 50 papers in international journals and more than 80 papers in peer-reviewed international conferences.

Presently he is the Head of Nuclear Safety, Sustainability and Security Division in the Department of Fusion and Technologies for Nuclear Safety and Security, ENEA.

Webinar by Govert de With on Friday June 23, 2023 at 15:00

Govert de With has a PhD in computational fluid dynamics from the University of Hertfordshire (UK). Govert has more than 15 years' experience in the field of radiation protection and is at present responsible for the radiation protection research in NRG, which includes research in the field of radioecology. He is a member of various professional bodies and committees, which includes a.o. membership of the UNSCEAR Expert Group on occupational exposure, and various ISO and CEN on radiation measurement. Following the accident at the Fukushima Daiichi Nuclear Power, Govert (co)authored multiple papers on the impact of the accident to the aquatic wild-life and recently assessed the consequences from Japan's proposal to release contaminated water to the Pacific Ocean.

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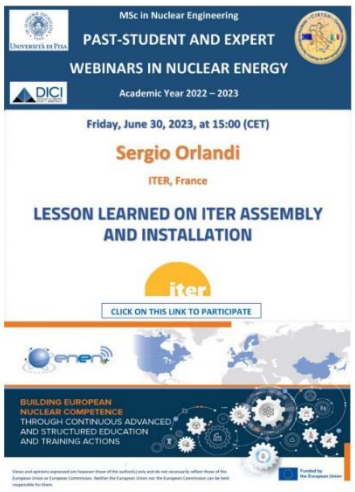
Webinar by Sergio Orlandi on Friday June 30, 2023 at 15:00



Sergio Orlandi graduated in Nuclear Engineering from the University of Pisa and is fluent in three languages. After a long experience in the Ansaldo Group, he was also general manager of Ansaldo Nucleare. Since 2013 he is the Head of the " Plant and Machine Engineering and Assembly" Department of the ITER project for the completion of the Fusion Nuclear Plant in Saint Paul Lez Durance, France. He is Member of the European Academy in Science and Arts and Dean of the Commission VI on Sustainable Energy.

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Past-student and Expert Webinars in Nuclear Engineering
2023 - 2024 Edition

W. Ambrosini, R. Lo Frano and N. Forgione

Pisa, August 1st, 2024 **RL 360(2024)**

Funded by the European Union

ABSTRACT

This report summarises the activity carried out by the University of Pisa in the frame of the webinars held by the MSc in Nuclear Engineering (fully taught in English) in fulfilment of the Task 3.2 of the ENEN2Plus project.

The activity consisted in the organisation of a number of webinars aimed at spreading knowledge about nuclear energy and related scientific matters. While these webinars have become a tradition at the University of Pisa since the 2021 year, when they were proposed because of the pandemic ongoing at the time, presently the new series has been better customised to the needs of the ENEN2Plus project, by calling all the project beneficiaries to contribute and by "…organising webinars about the novelties (e.g., nuclear safety, medical application, environment, decommissioning, space, etc.) involving the companies and research centres".

A total number of 33 webinars were organised and held in the period from October 2023 to June 2024 (http://nucleare.ing.unipi.it/it/webinars/webinars-2023-2024), making use of the Microsoft Teams platform. The start of the series in October allowed a greater number of webinars than in the past academic year. As in the past editions, a key feature of the webinar series was the mixing of talks by international experts in the nuclear fields and past-students of the MSc in Nuclear Engineering of the University of Pisa; however, in the present series most of the past-students were senior enough to be qualified also as experts. As a further novelty, the webinars were recorded (with a single exception), making them be available for asynchronous attendance on the MSc website.

The present report describes the experience gained and the lessons learned by running the initiative and from the final evaluation based on comments gathered from lecturers and attendants.

A Career Event is presently being planned at the University of Pisa to be possibly held on October 30th 2024, aiming to continue the initiatives set up in the frame of the ENEN2Plus project. A new series of webinars will be planned later on.

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1. INTRODUCTION

1.1 Updates on the recent history of the MSc in Nuclear Engineering in Pisa

In order to introduce the delivered webinars in the context of the MSc in Nuclear Engineering in Pisa, a short description of the programme is reported hereafter, in similarity with what already proposed in reports on the webinars issued for past editions. Since these considerations were already included in the previous report, the reader who is already aware of the related content can just focus on the updates reported at the end of this section. This holds also for part of the content of section 1.2, inherited from a previous report and updated to include new information.

The MSc in Nuclear Engineering at the University of Pisa [1] (Figure 1) has been established since the 1960s and has been maintained at high levels both in teaching and in the associate research activities through the global crises of nuclear energy following the accidents of Chernobyl and Fukushima, which resulted in two referendums that repeatedly stopped nuclear power production in Italy. At least two generations of teachers endured a hostile environment, strong of European and international connections that allowed them to continue actively contributing to the progress of the studies in Nuclear Engineering going on worldwide.

The firm inclusion of the University of Pisa, through the CIRTEN Consortium [2], in the European Nuclear Education Network (ENEN) [3] has been one of the points of strength for the MSc in Nuclear Engineering of the University of Pisa, whose faculty staff offered to the ENEN Association the presidency in the years 2013-2016. A considerable number of past-students of the MSc received the Certification of European Master of Science in Nuclear Engineering, released by the ENEN Association since 2005 (see at the link http://nucleare.ing.unipi.it/it/emsne), owing to the strict adherence of the studies in Pisa to the by-laws of the Certification and thanks to the policy of favouring MSc degree theses abroad at ENEN Member institutions to achieve the required “European dimension” of the studies. CIRTEN is a founding member of ENEN and the University of Pisa directly joined its actions in ENEN since the early times of the EU NEPTUNO Project (2004-2005), which established the EMSNE Certification. The University of Pisa is also Member of Fusenet [4], the sister network of ENEN for education in the field of nuclear fusion, and is actively participating in fusion researches in cooperation with ITER [5] and EuroFusion [6], thus enhancing the tight international links also established through numerous European and international research projects.

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Figure 1. Landing page of the MSc in Nuclear Engineering (http://nucleare.ing.unipi.it/it/)

As it is well known, in the year 2011 the aftermath of the Fukushima accident in Italy witnessed a referendum whose results were interpreted as the popular will to abandon the development of nuclear energy in our Country. This was the second referendum held in Italy referring to nuclear energy, following the one held after the Chernobyl accident in 1987. After a short period of renaissance in the interest for nuclear energy in our Country in the years 2000, this referendum determined, as an unfortunate by-product, the cancellation of the BSc in Nuclear Engineering at the University of Pisa. This decision was formally based on the momentarily lower number of enrolled students. Notwithstanding the repeated protests of the teachers in Nuclear Engineering, supported by representatives of the Italian nuclear industry and of state owned companies, as well as by the President of ENEN (at the time Prof. Joseph Safieh from CEA-INSTN), and despite the will of the university organisms, the cancellation of the BSc could not be avoided and represented a serious threat to the continuation of the studies in Nuclear Engineering in Pisa. As a matter of fact, this unfortunate occurrence resulted in line with the general wrong perception of nuclear energy as a closed issue in Italy, owing to the manipulation of undue fears against it. This attitude could and should be reversed now with better awareness of the role of nuclear energy as a key component of the future decarbonised energy mix in 2050. In this regard, the recent report by the Joint Research Centre of the European Commission on the “do no significant harm” issue has assessed the acceptability of the risks coming from nuclear energy in comparison to the ones posed by other energy production technologies, showing scientific evidence clearly supporting the decision that nuclear energy must be included in the so-called Green Taxonomy [7].

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After the termination of their BSc, the teachers in Nuclear Engineering in Pisa decided to enhance the international character of the MSc in Nuclear Engineering, strong of a very good reputation worldwide, by choosing to deliver its courses in English language. Owing to the international contacts established since decades by the vast majority of the teachers in the MSc Programme, it was relatively easy to conceive the new Programme fully taught in English. The effort for setting up the MSc taught in English language was eagerly undertaken by the younger and older generations of teachers. On the side of the students, the general opinion on this change was quite positive: the new teaching language was highly welcomed by the very high-level students enrolled at the time, which were well representing the highly qualified cohorts being graduated in Pisa every year. These students promptly understood the new opportunities granted by attending lectures in English language and by the accompanying policy of internationalisation of their studies, mainly implemented by favouring thesis internship to be made abroad at highly qualified and reputed institutions. These two actions, in fact, enhanced the already established tradition of students going abroad for thesis work, being thus launched in the international job market, where they are now covering very good positions in the nuclear community; some of their stories are reported at the webpage Past Alumni (unipi.it).

Delivering the courses in English language, in addition to provide enhanced competences to Italian students, opened the door to the enrolment of foreign students attracted by the opportunity to study at an illustrious and old institution as the University of Pisa, highly quoted internationally also for the studies in nuclear engineering. An advantage for foreign students is the fact that Italy in general and the University of Pisa in particular have a clear “welcoming” attitude, providing them with financial support (e.g., by the “Diritto allo Studio” offices of the Tuscany region and by specific welcome packages sponsored by the University of Pisa), also in consideration of the different welfare conditions between their home Countries and Italy. So, to some extent foreign students could be hosted in Italy with affordable expenses for lodging and subsistence.

As a matter of fact, the number of foreign students applying for enrolment at the University of Pisa grew considerably in recent years and for the academic year 2023-2024 the received candidatures exceeded the number of 1400 at the time of writing. Of course, an accurate screening of the candidatures reduces this number to few tens of foreign students who are accepted for enrolment each year. The selection process, performed on behalf of the MSc Board by a specific evaluating committee (named CIV), tends to be quite strict, aiming at selecting the best candidates who can have good chances to be successful in a programme that is traditionally tough, though absolutely fascinating and rewarding in terms of motivations and opportunities to succeed and to find a job in Italy and worldwide after graduation.

The absence of a BSc in Nuclear Engineering in Pisa, suppressed after the Fukushima accident, compels to enrol mostly Italian graduate students coming from BSc programmes in industrial engineering in Pisa (e.g., mechanical engineering, energy engineering, chemical engineering and aeronautical engineering) and also

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from other Italian Universities. A path to enrol graduate students with a BSc in Physics has been also conceived and made active. In this aim, all the necessary "nuclear core" matters are imparted at the MSc level, thus constituting a good opportunity also for professionals wishing to be "nuclearized", i.e., to convert their competencies to the nuclear field by enrolling either in single courses or in the full MSc programme. The delivery of lectures online, as a consequence of the Covid-19 pandemic, is certainly favouring these opportunities.

As a final reflection, it can be said that the decision to deliver the courses of the MSc in English language represented a further key step in the course internationalisation. Opening the course to foreign student attendance allowed, combined with the recording of lectures that happened starting with the Covid pandemic, may allow the attendance in the distance by professionals who cannot not attend in presence. One of the elective courses, Single and Two Phase Thermal-hydraulics, has been offered online since 2018 in the frame of the ANNETTE project and is also available for external professionals upon payment of a low fee.

In summary, webinars have been conceived as a valuable contribution to the teaching in the MSc in Nuclear Engineering and to its international character, bringing to students and to the general public, always invited to attend, the live voice of experts from all around the world.

1.2 The Past-student and expert webinars: origin and purpose of the initiative

In the above described international frame in which the MSc in Nuclear Engineering has been developed, seminar cycles in English language were systematically organised since 2013 on Friday afternoons, purposely left free in the lecturing calendar. Seminars were held in the years 2013, 2014, 2015, 2016, 2017, 2018 and 2019 on an occasional basis, taking profit of the presence in Pisa of some illustrious international experts or of past-students willing to present their recent work to our present students. In these previous experiences, the planning of the webinars was mostly driven by specific occasions, sometimes a latere of important conferences held in Pisa, as in the case of NURETH-15 in 2013. The webinar modality was tried in a single case, for a lecturer who could not join Pisa, using Skype and encountering several problems with the network connections available at the time. The attendance to these seminars "in presence" was generally very limited, totalling just 10 or 20 attendants at most, with few exceptions, owing also to the difficulty in advertising and in finding the right time of delivery for not colliding with other initiatives. The webinars were mostly, though not exclusively, held in the first months of the year, up to May. The attendance of the students was in fact assured during the lecturing period from the beginning of March to the end of May 2021 and was definitely more uncertain in other ones.

In 2020, the spreading of the Covid-19 pandemic and the rush to assure a good level of distance lecturing in an emergency situation monopolised the attention of teachers; the planning of seminars was obviously considered a second order problem and was de facto postponed. In December 2020, after getting better

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acquainted with the means for broadcasting lectures in an efficient way, the idea was proposed to organise webinars having mixed lecturers, belonging to the two partially overlapping categories of ”Past-students” and “Experts” in Nuclear Engineering. The partial overlapping of the two categories stems from the fact that “past-students” mostly already became or are becoming international experts in their fields of R&D. However, the evident twofold purpose of this choice was to describe to University of Pisa students the career of their older predecessors and to provide them with a varied programme of talks by experts in the nuclear field, even in the middle of the second wave of the pandemic.

In other words, depending on the subject selected by the lecturers, the webinars were useful to BSc level students, just to understand what could be their scientific career in choosing nuclear studies, to MSc level, students, to enrich the curricular lectures with specific specialised subjects, and to PhD students as well, owing to the high level content of lectures. The idea was then considered to enlarge the attendance to whoever could be interested in nuclear matters, by advertising the events at large by social networks and freely providing the related links to join the webinars. By the way, in addition to pretty technical lectures, it was tried with good success to involve high-level persons representing institutions in the nuclear and in the general energy fields that could deliver speeches on the perspectives of nuclear energy in the present historical situation in Europe and worldwide: these lectures in fact enlarged the audience, addressing people interested in energy policy, in particular in relation to nuclear energy.

The series organised in 2022-2023 changed its name to **Past-Student and Expert Webinars in Nuclear Energy**, thus enlarging the scope with respect to the initial focus to “Engineering”. This was appropriate in the frame of the ENEN2Plus in order to extend the scope as required by the inclusion in the new project, putting the accent also on non-power applications of nuclear energy. The DoW of the project in relation to Task 3.2, in fact, suggests that the objectives of the task can be achieved also by *“…organising webinars about the novelties (e.g., nuclear safety, medical application, environment, decommissioning, space, etc.)”*. This has been borne in mind in the organisation of the webinars by searching for lecturers and subjects not only related to the power applications of nuclear energy. As it will be shown later, the evaluation of the webinars, achieved by interviewing a limited number of attendants who decided to respond to a questionnaire, has suggested further matters to be covered. The change in the name was kept also in the series delivered in the academic year 2023-2024.

The following sections report about the organisational aspects involved in setting up the webinars and about the means of their delivery. The gained experience and the future perspectives for a continuation of the initiative will be also discussed. It can be anticipated that, very probably, the initiative will be kept for all the years of the ENEN2Plus project and even later, since it has reached full sustainability as a result of the

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continuing efforts made in this field. The inclusion into the ENEN2Plus project is giving to the initiative an even more international character, thus repaying the effort spent with an increased worth.

It is finally mentioned that, in the frame of an action stimulated by the 20th Anniversary of the ENEN Association, a paper has been published in an open access special issue of *Nuclear Engineering and Design*, also reporting about the initiative of the webinars. The paper is:

Walter Ambrosini and Roberta Cirillo,
Sustainable online initiatives for the dissemination of nuclear energy culture,
Nuclear Engineering and Design, Volume 420, 15 April 2024, 112988,
https://doi.org/10.1016/j.nucengdes.2024.112988 .

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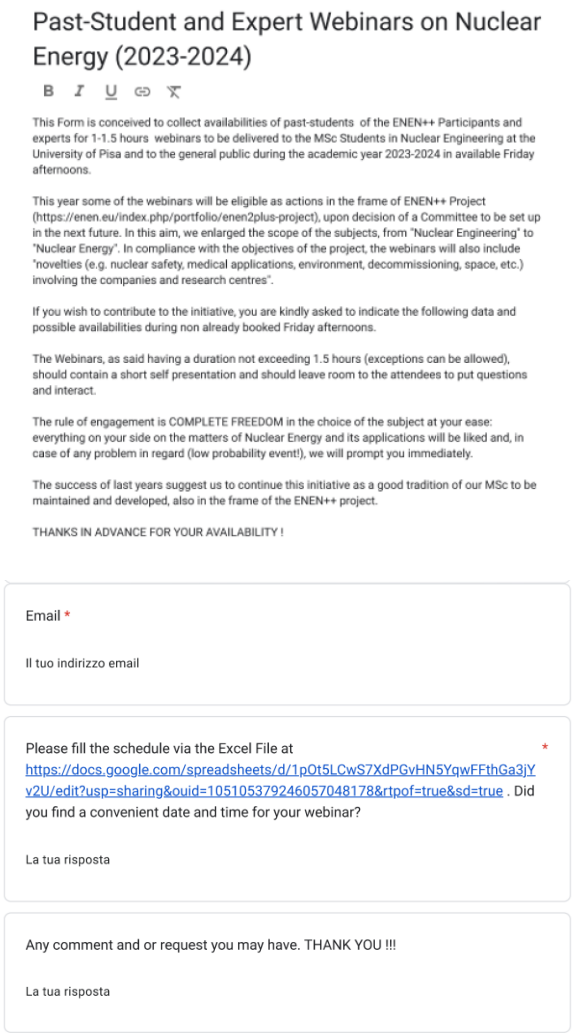
2. ORGANISING THE WEBINARS

As it was done in previous years, a first action in the organisation was establishing two Google Forms for collecting possible adhesions of lecturers and proposed attendants. In this aim, collective emails were sent to selected international experts in the nuclear fields and to past-students of the MSc in Nuclear Engineering, inviting them to propose their candidatures. Recruiting of past-students and experts went on also during webinar delivery, in order to match opportunities and needs in terms of scheduling.

The form for collecting lecturers' availability, reachable at the site

https://docs.google.com/forms/d/e/1FAIpQLSf7d6jqPxv1jQ0jTl_7-KMu4319sFQIzVJ3KFbUh9QczLdIZw/viewform

had the following content:



Past-Student and Expert Webinars on Nuclear Energy (2023-2024)

This Form is conceived to collect availabilities of past-students of the ENEN++ Participants and experts for 1-1.5 hours webinars to be delivered to the MSc Students in Nuclear Engineering at the University of Pisa and to the general public during the academic year 2023-2024 in available Friday afternoons.

This year some of the webinars will be eligible as actions in the frame of ENEN++ Project (https://enen.eu/index.php/portfolio/enen2plus-project), upon decision of a Committee to be set up in the next future. In this aim, we enlarged the scope of the subjects, from "Nuclear Engineering" to "Nuclear Energy". In compliance with the objectives of the project, the webinars will also include "novelties (e.g. nuclear safety, medical applications, environment, decommissioning, space, etc.) involving the companies and research centres".

If you wish to contribute to the initiative, you are kindly asked to indicate the following data and possible availabilities during non already booked Friday afternoons.

The Webinars, as said having a duration not exceeding 1.5 hours (exceptions can be allowed), should contain a short self presentation and should leave room to the attendees to put questions and interact.

The rule of engagement is COMPLETE FREEDOM in the choice of the subject at your ease: everything on your side on the matters of Nuclear Energy and its applications will be liked and, in case of any problem in regard (low probability event!), we will prompt you immediately.

The success of last years suggest us to continue this initiative as a good tradition of our MSc to be maintained and developed, also in the frame of the ENEN++ project.

THANKS IN ADVANCE FOR YOUR AVAILABILITY !

Email *

Il tuo indirizzo email

Please fill the schedule via the Excel File at https://docs.google.com/spreadsheets/d/1pOt5LCwS7XdPGvHN5YqwFFthGa3jYv2U/edit?usp=sharing&ouid=105105379246057048178&rtpof=true&sd=true . Did you find a convenient date and time for your webinar? *

La tua risposta

Any comment and or request you may have. THANK YOU !!!

La tua risposta

In order to obtain first adhesions of attendants, the webinars were advertised by posting the announcement reported in Figure 2.

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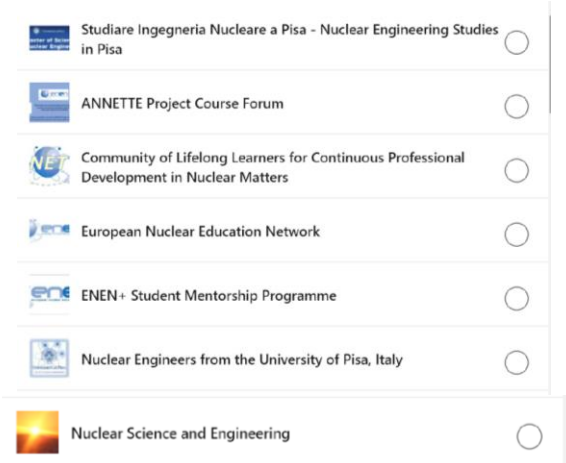
Figure 2. Announcement posted on social networks to advertise the series of webinars

The announcement was posted on both Facebook Pages and LinkedIn Groups. In both cases, the post was firstly posted on the pages of the organiser and then shared on other pages or groups. In particular:

- on Facebook, the following pages were used:

- on LinkedIn, the following groups were addressed:



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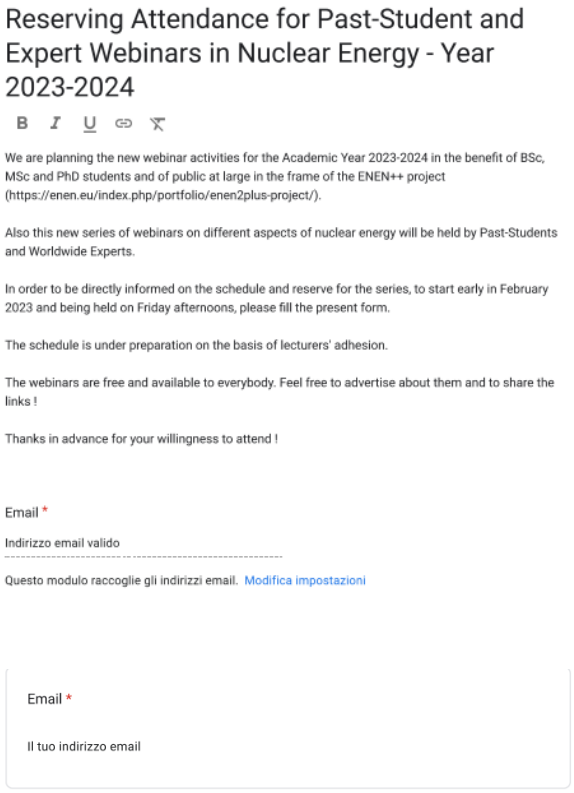
As it can be noted, the use of the pages set up in recent ENEN projects (ANNETTE and ENEN+) was made in addition to the ones set up for the MSc in Nuclear Engineering at the University of Pisa. This contributed to keep alive the interest in ENEN's activities in continuity to what done in the period of the pandemic. The direct link to Twitter active in the past years was no more available.

The reservations to be informed about the webinars were collected by the Google Form available at the link:

https://docs.google.com/forms/d/e/1FAIpQLScet-NFcfLZ49JUZh_pw0f0mzSVagHdRSZn1YMZONmhXo3TRg/viewform

The content of the form is the following:



Reserving Attendance for Past-Student and Expert Webinars in Nuclear Energy - Year 2023-2024

We are planning the new webinar activities for the Academic Year 2023-2024 in the benefit of BSc, MSc and PhD students and of public at large in the frame of the ENEN++ project (https://enen.eu/index.php/portfolio/enen2plus-project/).

Also this new series of webinars on different aspects of nuclear energy will be held by Past-Students and Worldwide Experts.

In order to be directly informed on the schedule and reserve for the series, to start early in February 2023 and being held on Friday afternoons, please fill the present form.

The schedule is under preparation on the basis of lecturers' adhesion.

The webinars are free and available to everybody. Feel free to advertise about them and to share the links !

Thanks in advance for your willingness to attend !

Email *

Indirizzo email valido

Questo modulo raccoglie gli indirizzi email. Modifica impostazioni

Email *

Il tuo indirizzo email

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Data Treatment *

☐ I accept the treatment of my data for the sole purpose of being informed about the webinars and for internal statistical analyses

Name and Surname *

La tua risposta

Institution *

La tua risposta

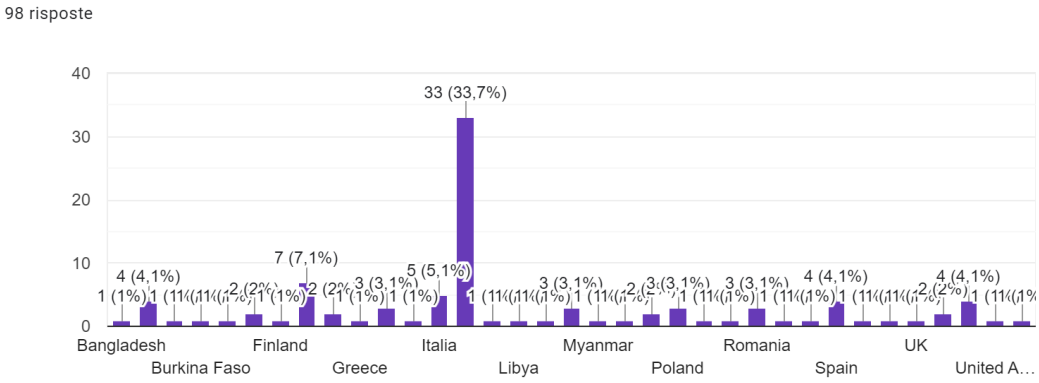
Country *

La tua risposta

Position *

- ○ BSc Student
- ○ MSc Student
- ○ Interested person other than student
- ○ PhD Student
- ○ Altro:

The form collected in total 98 adhesions from several Countries as in the plot below:



The list of email addresses, collected with specific authorisation by the persons showing their interest, was then used to advertise the webinars, adding it to a broader list of possible interested persons, including the lecturers and consisting of more than 800 addresses, organised in a mailing-list named “NuclearWebinars”. The distribution by categories of the 98 contacted people is reported in Figure 3. As it can be noted, 33.7% of the reached population belong to the general public and the rest was subdivided into different categories of students at the three university levels. This confirms the capability of this kind of initiative, already noted in previous editions, to reach out and disseminate information about nuclear energy among the general public most probably constituted by scientists and researchers.

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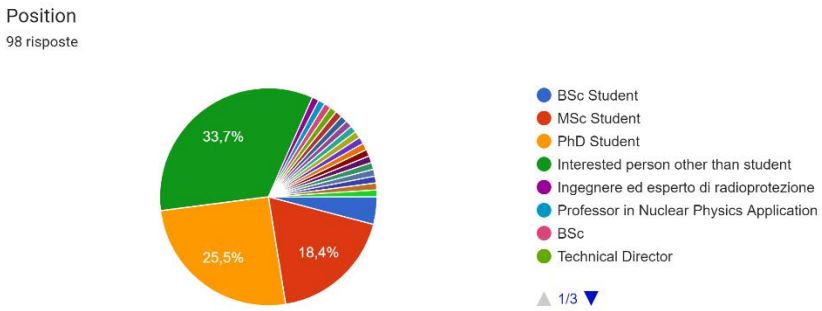

Figure 3. Distribution of reserving attendants among different categories

The distribution of the information on each one of the webinars occurred making use of the same Facebook and LinkedIn channels adopted for the initial advertising. In particular, the following systematic procedure was used for advertising each webinar:

- sending an email message to the distribution list obtained by the 98 proposed attendees who reserved by the Google Form plus the huge number of additional possibly interested persons for a total of more than 800 addresses; the mailing list, whose managing panel is located on the University of Pisa servers, was introduced in the past edition for making easier the distribution of information;
- posting on Facebook and LinkedIn on the pages and the groups reported above (see examples in Figure 4); as mentioned, after the first post on the pages of the organiser, the announcements were spread on multiple pages in both social networks;
- reporting the announcement of the webinar, the picture of the lecturer and his/her short CV on the website of the MSc in Nuclear Engineering in Pisa (http://nucleare.ing.unipi.it/it/webinars/webinars-2023-2024);
- sending to the communication unit personnel of the Dipartimento di Ingegneria Civile e Industriale, to the Unità Comunicazione Istituzionale of the University of Pisa, to ENS and to ENEN the material for advertising, in order to have further posts on the related websites (see examples in Figure 5 and Figure 6 for the websites of the DICI and UNIPI).

This communication pattern was systematically repeated for all the webinars, typically sending circular messages on the previous Friday late evening and sending a reminder on the morning of the day of the webinar.

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Figure 4. Announcements posted on LinkedIn and Facebook for the webinar of Dr. Francesco Ganda

Figure 5. Announcement posted on the page of events of the Dipartimento di Ingegneria Civile e Industriale in relation to the webinar of Dr. Francesco Ganda

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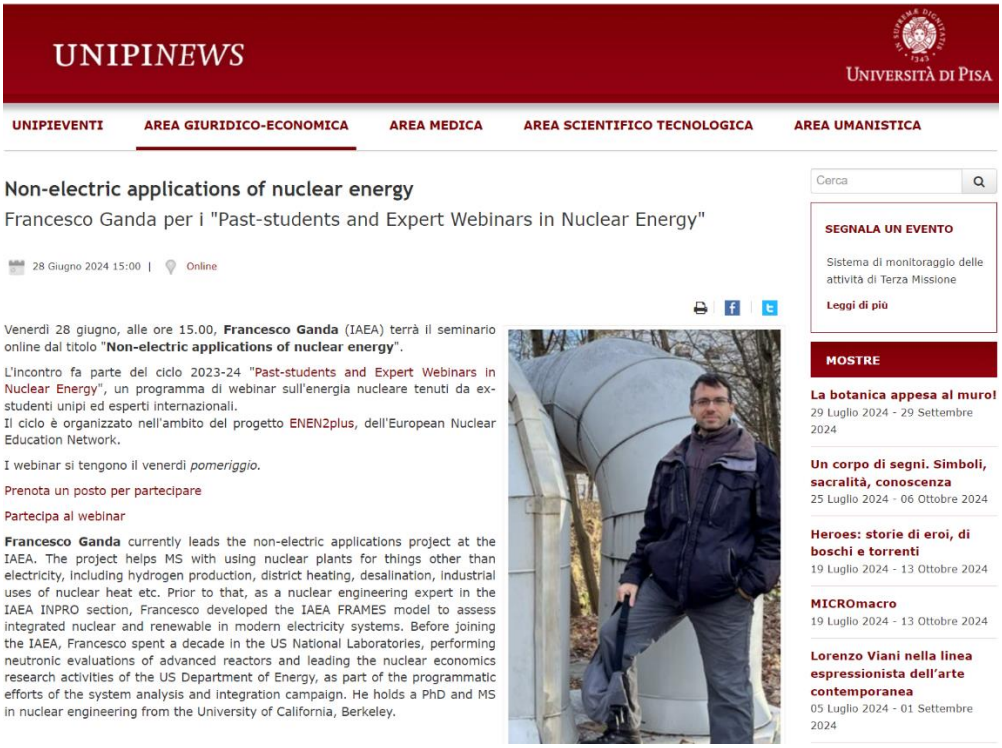

Figure 6. Internal page of the announcement posted on the website of the University of Pisa in relation to the webinar of Dr. Francesco Ganda

The final list of webinars, collected incrementally while the lecturers were providing adhesions, is reported at the website http://nucleare.ing.unipi.it/it/webinars/webinars-2023-2024 . As it can be noted, **the involved subjects include both nuclear fission and nuclear fusion as well as general subjects about the power and non-power uses of nuclear energy**. More general subjects related to the role of nuclear energy in the present decarbonisation process were also addressed. Lecturers came mostly from Europe, though contributions from extra-European Countries are also present.

As in the past, the criterion adopted for selecting the lecturers and the subjects was to search in the group of well reputed scientists and institutions, leaving anyway to the lecturers the complete freedom to propose the topics they found most suitable for an attendance characterized by different levels of knowledge, competence and expertise. This made easy for them to prepare the material to be proposed in the lectures, while the interest of the selected subjects for the audience was assured by their high level of expertise. Similar considerations hold for the past-students, all involved in international projects at a very high level; in their case, the interest of their talks for the present students attending the webinars consisted also in their testifying about the specific experience in finding highly qualified jobs in the nuclear field. These two ingredients were considered highly valuable: in a nutshell, the webinars brought to the students and to the external attendees the live voice of people involved in research and development in industry, research

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centres and academy. These choices, experimented in previous years, resulted useful and affective also in the present one.

Appendix A reports the announcements of the webinars, the pictures of the lecturers and their short CV, as appearing at the website of the MSc (http://nucleare.ing.unipi.it/it/webinars/webinars-2023-2024), testifying for the high level and the variety of subjects of the 33 delivered webinars.

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3. RUNNING THE WEBINARS

The Webinars were delivered by the use of the Microsoft Teams platform adopted at the University of Pisa. The tool resulted quite suitable for the purpose and the network was stable and efficient in all conditions. The features of the adopted software provided a good frame for showing the presentations of the lecturers and to allow for the subsequent discussion. A specific Team was prepared (Figure 7) and the webinar events were generated using the calendar. The generation of the events provided the .ics files to be distributed for accepting the engagement, e.g., in an Outlook calendar. The link to the webinar was generated automatically and it was used as a hyperlink both in the .pdf files of the announcement and on social networks to allow for a quick joining.

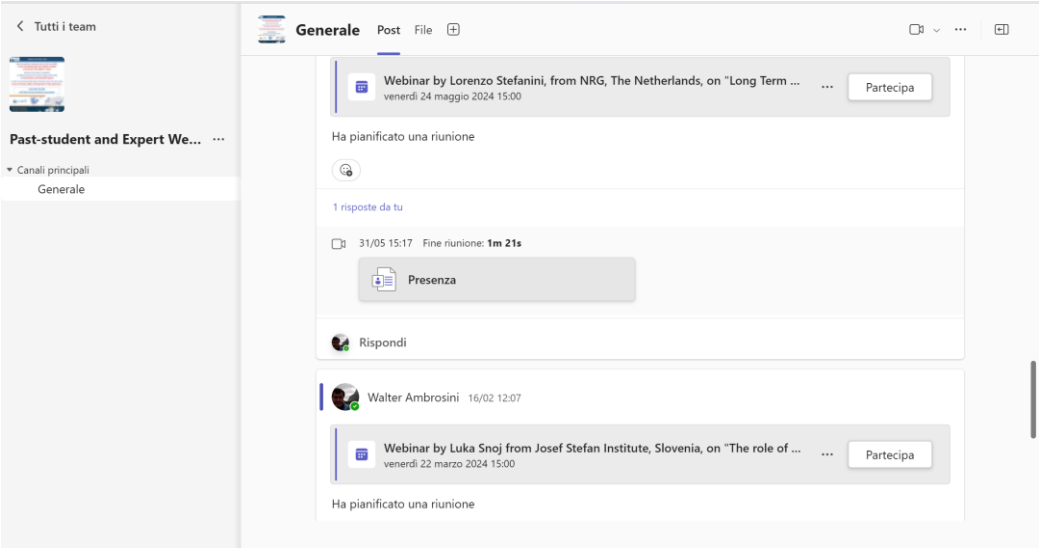

Figure 7. Team adopted for the webinars through Microsoft Teams

The duration of the webinars was variable, ranging mostly from 1 to 1.5 hours, with most of them being of about 1:10 – 1:30 hours. Questions were generally posed to the lecturers at the end of their presentations, often resulting in lively Q&A sessions.

Microsoft Teams allows to obtain reports about the attendance, providing the detail of the persons joining and exiting the Team during the period of delivery of the webinar. By periodically downloading the report, it was possible to monitor the attendance at each webinar, in terms of maximum number of attendees who connected at least for a while to the webinar. In fact, the reports show that some attendees joined and then detached from the webinar owing to their own choices or network problems. Figure 8 reports the maximum number of attendants for each webinar (as above specified). It can be noted that a few webinars reached very high number of attendees, also in comparison with previous editions. This was also due to the cooperation with the EU TANDEM Project (Home - TANDEM (tandemproject.eu)) in whose frame some webinars were jointly delivered.

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A ritual opening the microphone and clapping hands to the lecturer at the end of the Q&A was established in order to applaud the lecturer as the presentation would have been done in presence.

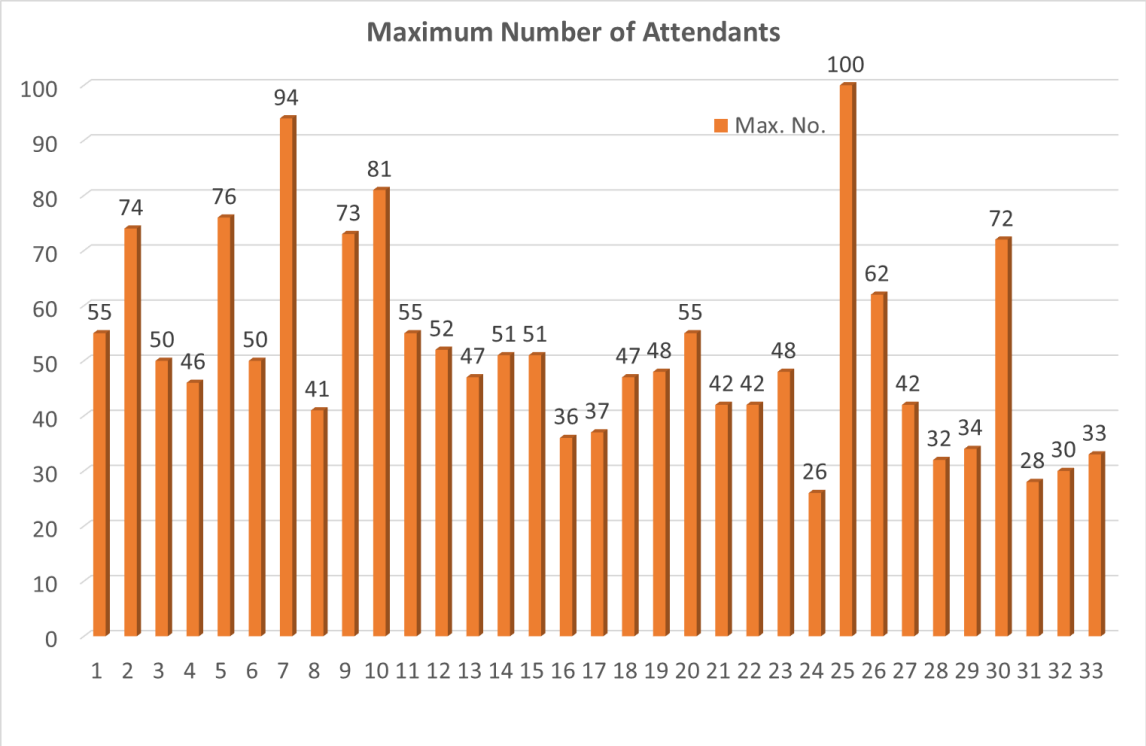

Figure 8. Total number of attendees that joined the webinars

In general terms, the webinars always had all a reasonably numerous attendance, generally higher than in previous years in which they were not included in an EU project. As it will be shown in the next section, the initiative was highly appreciated and the attendants always showed interest in their participation.

Figure 9 to Figure 11 report some of the collage posters that were used on social networks to advertise about the completion of the webinars, especially when asking for the evaluation of the initiative as described in the following section.

In terms of costs spent for the webinars, it is necessary to mention that all the lecturers adhered for free to the initiative. This is an aspect suggesting that the initiative was highly valued also by the lecturers, as an occasion to contribute with their work to spread knowledge about nuclear energy issues to an audience of interested students and researchers. This aspect will be stressed more in the next section, considering the evaluation received by a sample of attendants and researchers who responded to a specific poll.

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Figure 9. Collage posters used on social networks to advertise the initiative

Figure 10. Collage posters used on social networks to advertise the initiative

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Figure 11. Collage posters used on social networks to advertise the initiative

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4. EVALUATION OF THE EXPERIENCE IN THE YEAR 2022-2003 AND LESSON LEARNED

As in past editions, a Google Form was prepared for letting attendants and lecturers evaluate the initiative and propose suggestions for improvements. The form, available at the website

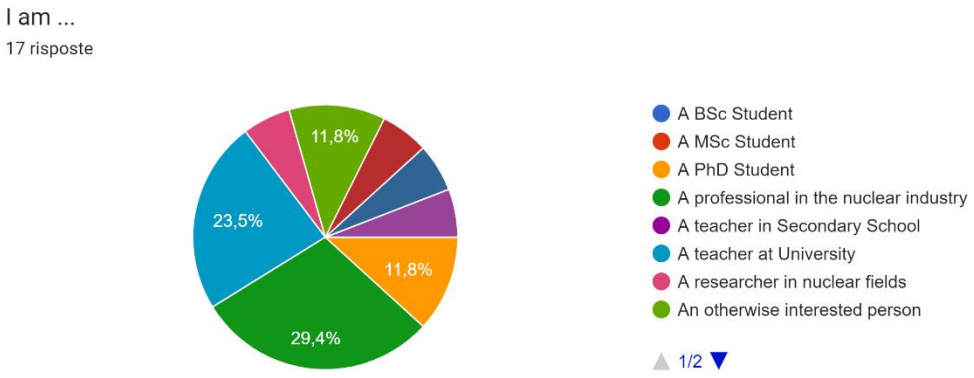
https://docs.google.com/forms/d/e/1FAIpQLSeOnMdt2MghnJ4PsL6C0LhLeSXBHGhmz8TwhPCgA8NYjnA1Lw/viewform

was responded at the time of writing by 17 persons. In particular, the form had a foreword explaining its purpose:

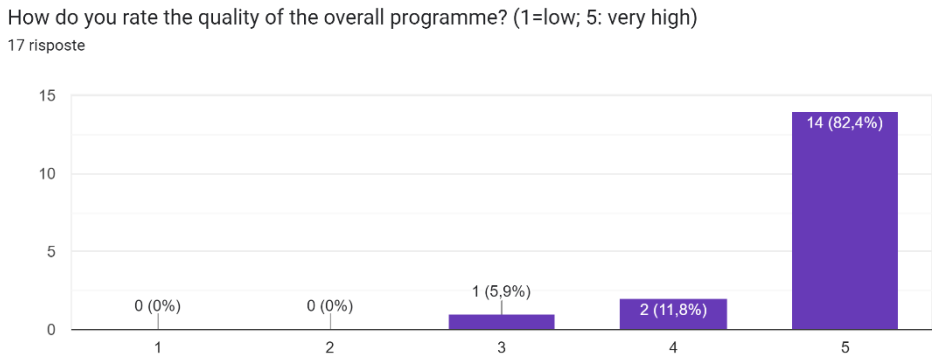
> *With this form we ask you to evaluate our webinar series. In filling the form, you will accept that your answers will be used for statistical analysis and reporting on the success of the webinars. We are not asking you evaluation of the specific webinars or of the single lecturers, but general comments on the interest of the subjects, the organisation and the possible improvements.*

The obtained answers are shortly commented below.

- The respondent was firstly asked to qualify himself/herself in a category. The obtained breakdown is reported below:



- Then the quality of the overall programme was asked to be ranked, obtaining a rather positive evaluation:



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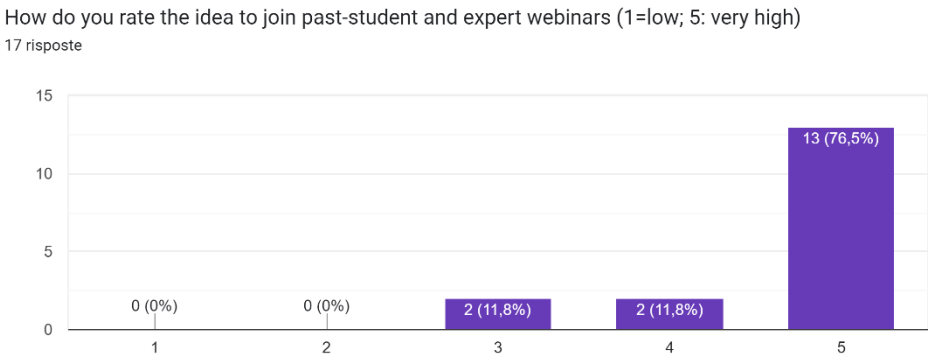
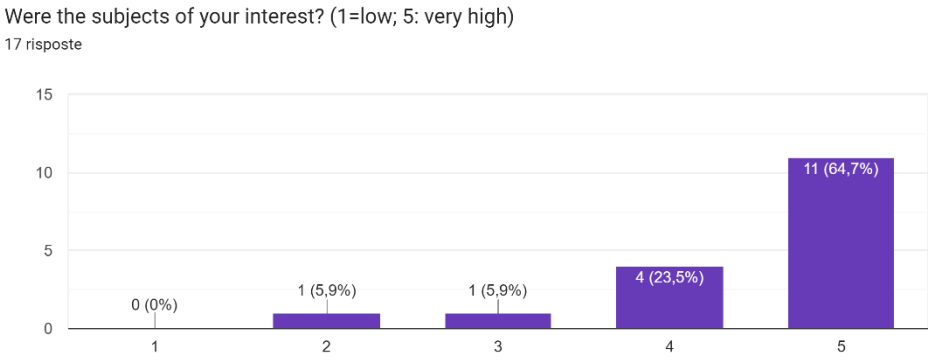
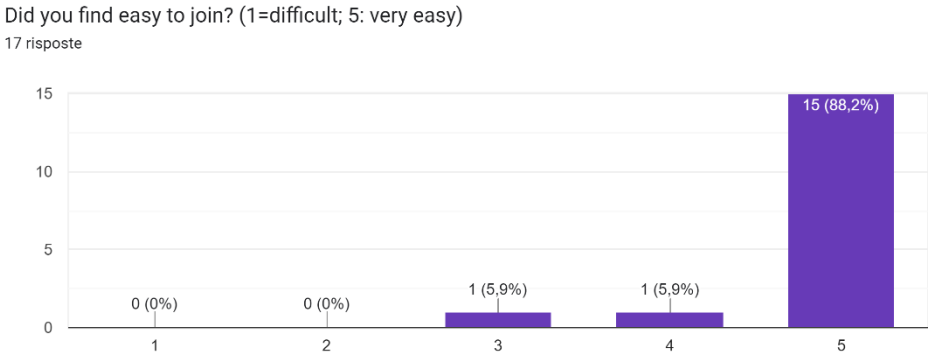
- The idea to mix past-student and expert webinars was then rated, also obtaining a high level of appreciation as in previous years:



- The interest of the subjects covered also resulted relatively high for the attendance:



- The ease to join the webinars was also evaluated:



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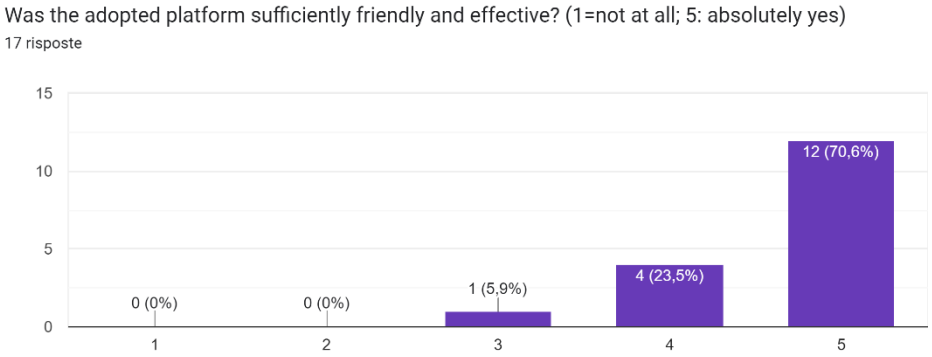
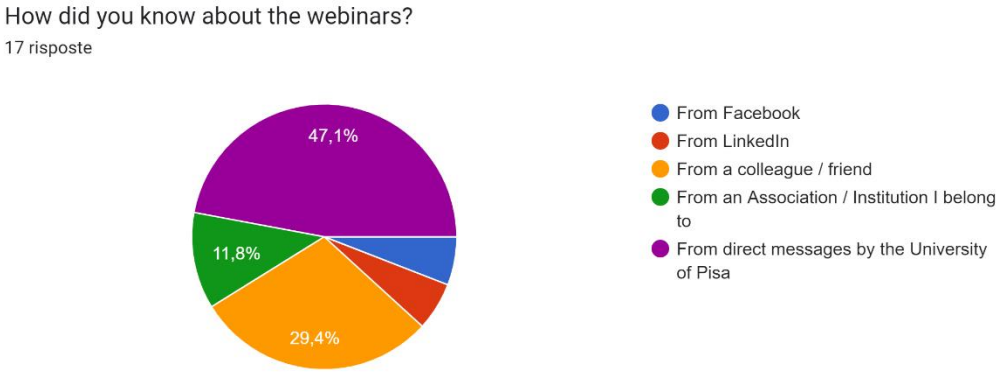
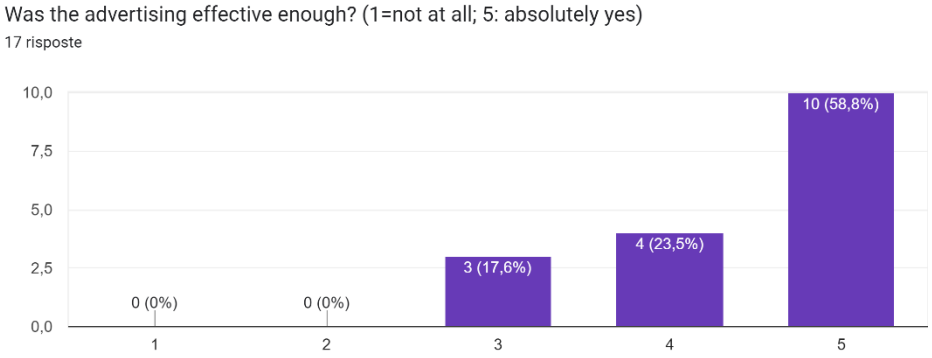
- Similarly, the adopted platform (i.e., Microsoft Teams) was considered mostly adequate to the purpose:



- The effectiveness of the advertising was also checked, providing the result, observed also in previous editions, that the use of Facebook seemingly was not very useful for the sample of respondents. LinkedIn seemed to be more effective among the social networks:



- As a confirmation of the above, it seems that the advertising, though good enough, could be improved:



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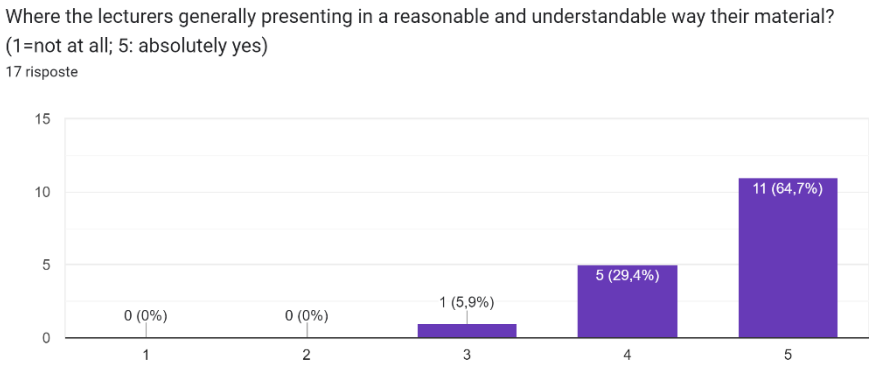
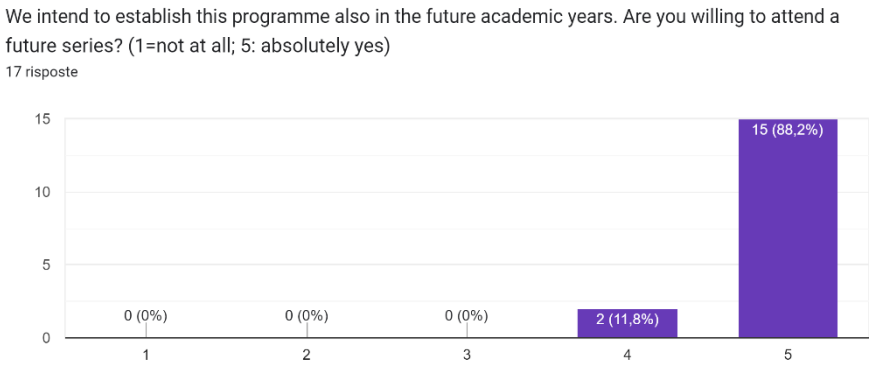
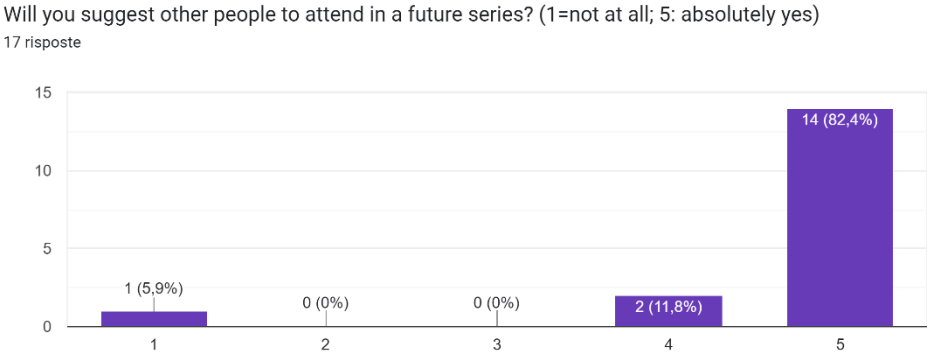
- As in previous editions, globally the lecturers seemed to be clear enough in their presentations. This is a confirmation that in the nuclear field the quality of ongoing work is definitely high, to say the least:



- The satisfaction of the attendance was checked asking about the intention to join future editions:



- A further question aimed at checking the satisfaction of the attendance got also a positive answer with some deviation to be understood:



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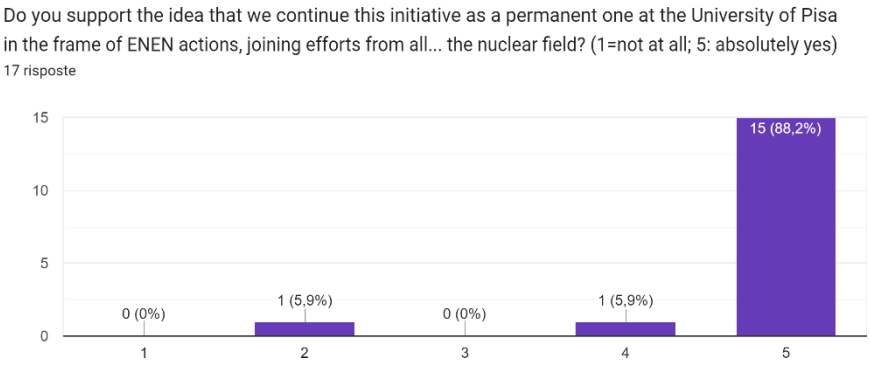
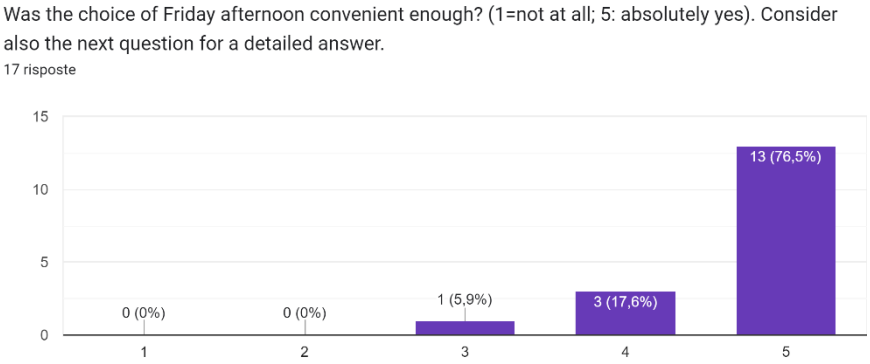
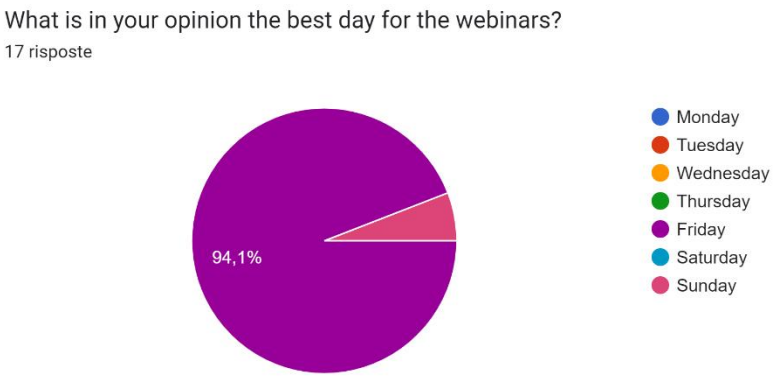
- Then, a question about the continuation of the program was proposed:



- About the choice of the day in the week, Friday seems a good choice, with some disagreement:



- A clearer question was put in this regard, having a similar result. Indeed, Friday is the best day in the week:



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- It was then asked which subjects could be considered .

Suggest future subjects and/or lecturers you would like to see in our next series:

  - Safety systems used to NPP
  - Nuclear radiation protection
  - yes
  - Advanced reactors development
  - perhaps you have colleagues from Ukraine, it would be interesting to listen to them too
  - Role of numerical analysis in thermo-structural assessment and application of nuclear Codes
  - Design Basis Accidents (DBA) of new generation power plants - technical aspects. 2) senescence of actual NPP

- Finally, a field was left for free comments. The received ones were thirteen:

  - Thanks
  - Keep up the good work
  - no
  - THANK YOU VERY MUCH FOR THIS INITIATIVE AND I HOPE IT CONTINUES IN THE FUTURE
  - Each presentation/seminar was very informative and educational.
  - I really enjoyed the seminar and the programming that I found very interesting and diverse. Thank you for the organization.
  - Thank you! It was very interesting to listen and ask questions!
  - Grazie per l'impegno e l'organizzazione

The feedback obtained from the responses will be attentively taken into consideration.

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5. CONCLUSIONS AND FUTURE PERSPECTIVES

The preparation and delivery of the Past-student and Expert Webinars in Nuclear Engineering by the MSc in Nuclear Engineering of the University of Pisa during the first half of 2021 can be considered a pilot experiment that was followed by three additional editions of the series of webinars, including the present 2023-2024 one delivered in the frame of the ENEN2Plus project.

With respect to the previous editions, subjects specifically suggested in the DoW of the ENEN2Plus project were addressed and an effort was made in order to make available the recordings, when allowed by the lecturers, thus starting to constitute a repository of interesting presentations about key subjects in the nuclear energy field.

The evaluation of the delivered series through a specific poll suggested that the webinars were well received by the audience and allowed to obtain useful suggestions of new subjects to be covered in the next series.

Starting with November 2024, a new series of webinars will be delivered, continuing the useful experience that was initiated by taking the chance of a more friendly attitude of lecturers and attendants towards the delivery of presentations in remote, obtained as a by-product of the remarkably challenging experience of the Covid-19 pandemic.

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ACKNOWLEDGEMENTS

The MSc in Nuclear Engineering, represented by its President, Prof. Nicola Forgione, and its Vice-President, Prof. Valerio Giusti, wishes to acknowledge the kind contribution of lecturers, past-students and international experts, who enthusiastically adhered to the initiative, providing high-level contributions, which encountered so much success as testified by the feedback received by the attendants.

The support of the European Commission through the Project 101061677 — ENEN2plus is duly acknowledged.

Funded by the European Union

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[4] Webite of FuseNet: FuseNet — The European Fusion Education Network | FuseNet

[5] Website of the ITER Organisation: ITER - the way to new energy

[6] Website of EUROfusion: Home- EUROfusion (euro-fusion.org)

[7] Technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of Regulation (EU), 2020/852 ('Taxonomy Regulation'), European Commission Joint Research Centre, Petten, 2021, JRC124193. https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/210329-jrc-report-nuclear-energy-assessment_en.pdf

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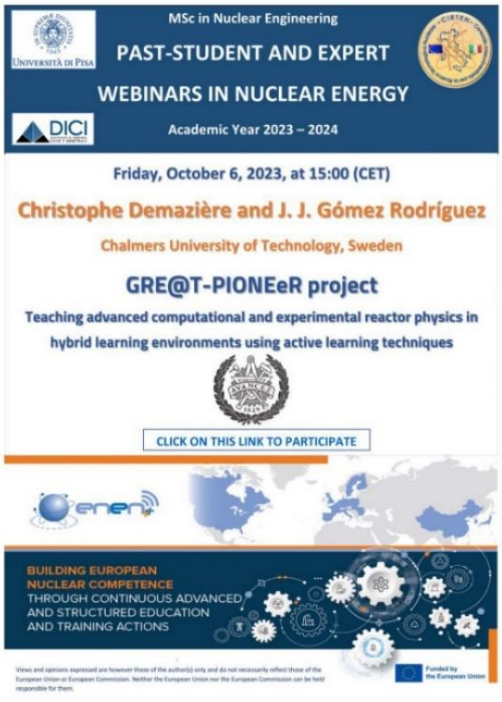
APPENDIX A – ANNOUNCEMENTS OF THE DELIVERED WEBINARS AND CV OF THE LECTURERS

Webinar by Christophe Demazière and Juan José Gòmez Rodriguez on Friday October 6, 2023 at 15:00



Christophe Demazière earned his PhD in reactor physics in 2002 and is now full professor at Chalmers University of Technology, Gothenburg, Sweden. He is responsible for the research and teaching activities in computational nuclear reactor physics at Chalmers. The research group gathers a cross-disciplinary expertise in neutron transport, fluid dynamics, heat transfer, and numerical methods. The aim of the group is to develop beyond state-of-the-art techniques for modelling nuclear reactors, thus contributing to improved simulations tools and enhanced safety.

Prof. Demazière is lecturing in courses on the physics and modelling of nuclear reactors. He has authored a book on the "Modelling of Nuclear Reactor Multi-physics - From Local Balance Equations to Macroscopic Models in Neutronics and Thermal-Hydraulics". For the past ten years, he has been developing and implementing innovative pedagogical methods (flipped classroom, active learning, hybrid teaching and online teaching) in all his teaching activities, with the purpose of improving student learning and the learning experience. For that purpose, the effects of the teaching reforms are systematically analyzed and evaluated. Since 2020, he is the acting coordinator of the Horizon 2020 GRE@T-PIONEeR project.

He is a member of the American Nuclear Society.

Juan José Gómez Rodríguez is currently completing his master's degree in nuclear engineering at the University of Pisa, Italy. He is currently engaged in research at the Technical University of Dresden, working on his master's thesis in the field of reactor physics, specifically focusing on the determination of integral cross section data for various materials using the pile oscillation method at the training reactor AKR-2. Prior to his master's studies, Juan completed his bachelor's degree at the National University of Colombia in Bogotá. During his undergraduate studies, he conducted research and authored two articles in the field of electromagnetic methods in geophysics, exploring their potential applications for earthquake forecasting. Furthermore, Juan gained experience by working for two years at the primary research center that owns the only nuclear research reactor in his home country, the Colombian Geological Survey. In the past year, he completed a six-month internship at the Vienna Center for Disarmament and Nonproliferation, during this time, he focused on topics related to nuclear safeguards for innovative and evolutionary reactor designs and the social perception of nuclear energy.

In his involvement with the EU-GRE@TPIONEeR> project, Juan has successfully completed four courses, including the onsite course of neutron transport at fuel cell and assembly levels, hands-on training in the TU Dresden reactor, and online courses on core modeling for core design and radiation protection in nuclear environment. He actively encourages his colleagues to partake in these extracurricular training opportunities due to the numerous benefits they offer and their potential to complement their future careers as scientists.

Link to the Webinar

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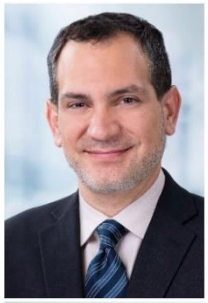
Webinar by Luca Oriani and Julie Gorgemans on Friday October 13, 2023 at 15:00



Dr. Luca Oriani has held the position of Global Chief Engineering Services Officer and Senior Vice President for Engineering Services for Westinghouse Electric Company, LLC, since June of 2019. He is responsible for Westinghouse plant and component engineering competencies, methods, tools and assets for both operating and new plants, including Westinghouse engineering personnel at over 20 main global locations. Previously, Dr. Oriani has held a number of roles for Westinghouse, starting in advanced reactors research and technology in 2002. During his career at Westinghouse, Dr Oriani has been responsible for development of advanced safety analyses methodologies and their licensing and applications in the US and Europe, and between 2013 and 2016 has covered different roles in the completion of the design and completion of the first AP1000 units in China and then the US. Since 2016, Dr. Oriani had responsibility for engineering all Westinghouse new plant projects. His career has been devoted primarily to the development of advanced nuclear systems and advanced safety solutions for nuclear power plants, and he is the author of more than 50 technical papers and reports on these subjects. Dr Oriani is a graduate of the Polytechnic Institute of Milan, Italy, and a fellow of the 1st World Nuclear University Summer Institute.

EDUCATION:

5-year Laurea (M.S.) in Nuclear Engineering, Polytechnic Institute of Milan, 1997
Doctorate in Nuclear Engineering, Polytechnic Institute of Milan, 2001

Julie Gorgemans joined Westinghouse in 2005, developing nuclear systems solutions in support to safety improvement projects and power uprating programs on European pressurized water reactors. She then joined the Westinghouse new plant division in 2008 which she supported until 2017, working on the development and International deployment of the AP1000 plant. During these years, Julie worked on the finalization of the AP1000 passive safety systems, contributed to several proposal developments for European customers, and spent four years in the UK working on the Generic Design Assessment of the AP1000 plant by the UK safety authorities and the development of the AP1000 Moorside project. From 2017 until early 2021, she focused on the support to European pressurized water reactor customers as a product manager for the nuclear island engineering services, with a focus on long term operation. In 2021, she returned to support Westinghouse new plant division and provides technical leadership for new plant business and bid proposal development in Europe. She recently became Senior Project Engineering Manager as she took on the additional role of leading the AP300 design development program.

EDUCATION:

M.S. degree in Physics Engineering, Université Libre de Bruxelles, 2005
M.S. degree in Business Administration (MBA), University of Manchester, 2019

Link to the Webinar

Funded by the European Union

Webinar by Claudia Gasparrini on Friday October 20, 2023 at 15:00

Claudia Gasparrini is a nuclear materials scientist and Chair of the Italian Nuclear Young Generation (gathering under 40 professionals and students affiliated to Associazione Italiana Nucleare). Academic Visitor in the Department of Materials at Imperial College London she was a Business Development Manager in RINA and previously a researcher and fellow at Consorzio RFX where she worked on materials performance in nuclear fusion systems thanks to a EUROfusion Engineering Grant linked to the Divertor Tokamak Test and ITER Neutral Beam Test Facilities . Previously she worked as a Research Associate at Imperial College London investigating neutron irradiation embrittlement of nuclear reactors pressure vessel steels in collaboration with the Australian Nuclear Science and Technology Organisation (ANSTO), Australia and the UKAEA Materials Research Facility (MRF), UK. She obtained a PhD in Nuclear Materials and Ceramics from Imperial College London focusing on oxidation of non-oxide nuclear fuels in collaboration with National Nuclear Laboratory, UK, Alternative Energies and Atomic Energy Commission (CEA) Cadarache and Institut de Chimie Séparative de Marcoule, France. She worked in Japan as a Decommissioning Engineer intern for the UK ABWR in Hitachi-GE Nuclear Energy, Ltd. She holds a BSc and MSc in Chemical and Process Engineering from Padua University, Italy specialising in Nuclear Chemistry and Engineering at the Royal Institute of Technology, KTH, Sweden.

Link to the Webinar

Funded by the European Union

Webinar by Mihaela Bacalum on Friday October 27, 2023 at 15:00

Mihaela Bacalum has over 15 years of experience in cellular biophysics and biology gained working in the Department of Life and Environmental Physics from Horia Hulubei National Institute of Physics and Nuclear Engineering (IFIN-HH). In 2009 she got a M.Sc. in Neurobiology and in 2013 a Ph.D. in Biophysics and Biomedical Sciences. Her areas of expertise include lipid membrane interactions, evaluation of antimicrobial compounds efficiency *in vitro,* evaluation of anticancer compounds efficiency *in vitro* against 2D and 3D (spheroids) cell cultures, and *in vitro* cellular radiobiology of cells treated with low energy proton beams. She is the author of more than 50 articles and over 60 international communications. She is a scientific advisor of more than 20 undergraduate and master students and 3 PhD students. Presently she is the Head of Department of Life and Environmental Physics from Horia Hulubei National Institute of Physics and Nuclear Engineering (IFIN-HH).

Link to the Webinar

Funded by the European Union

Webinar by Ahmed Bentaib on Friday November 3, 2023 at 15:00

Ahmed Bentaib is an expert on nuclear safety in IRSN since 2000. He received his Ph.D. from Lyon University in 1993 and the Accreditation Diploma to Supervise Research (HDR), from the University of Orléans in 2020.
His research interests cover Severe Accidents, modeling of hydrogen dispersion, mitigation and combustion phenomena pertinent to safety of nuclear and industrial facilities. As a result of his research, he is published more than 100 papers in refereed journal and international conferences.
During his career, Ahmed BENTAIB has contributed to several national, European, OECD and IAEA projects. After more than 20 years of professional career, he is Vice-Chair of the OECD-NEA Working Group on Analysis and Management of Accidents (WGAMA), co-leader of the Technical Area 2 on Severe Accidents of NUGENIA and Chair of the ETSON expert group on severe accident.
Along his career, Ahmed BENTAIB has collaborated in universities, and presently he is lecturer in masters' courses related to nuclear safety.

Link to the Webinar

Funded by the European Union

Webinar by Luca Ferrante on Friday November 10, 2023 at 15:00

Luca Ferrante graduated from the University of Bologna in Civil Engineering and has over 15 years of experience in management and construction of NPP. His experience in nuclear power began at MO34 for the refurbishment and completion project of the 2 VVER440 (1.654 MW tot), managing the engineering of the convection and the nuclear island and then creating the turnover process of the buildings and the relate systems to commissioning team in order to begin the commissioning and future operations. Luca Ferrante is currently working as a Senior Project Manager for Bylor, (JV between Bouygues TP and Laing O`Rourke), for the construction of 2 EPR at HPC Hinkley Point C (3.2 GW). At HPC has been involved in the manufacturing and assembly of the PTLS scope (pools, tanks, containment liner and sumps) across the 2 units for the Nuclear Island and since the 2021 is in charge of delivery of the HLs safety building, managing the civil works and the coordination of MEH installation. In parallel, Luca is actively involved with Bologna and Roma University running workshops regarding Nuclear Quality and Management of Nuclear construction.

Link to the Webinar

Funded by the European Union

Webinar by Gianfranco Caruso on Friday November 17, 2023 at 15:00

Gianfranco Caruso is Full Professor in Nuclear Engineering at Sapienza, University of Rome. He received his MS degree in Nuclear Engineering in 1984 and earned his PhD in Energy in 1989, focusing on severe accidents in nuclear plants. He is a member of the Scientific Council of ICHMT and representative member of Sapienza in the Governing Board of CIRTEN. Prof. Caruso is a member of the “National Commission for the Forecasting and Prevention of Major Risks" of the Department of Civil Protection – nuclear and radiological risk subcommittee. He is currently leader of the Sapienza “Nuclear Engineering Research Group” in ongoing national and international projects related to nuclear topics and the reference person for Sapienza research activities in the framework of the EUROFUSION project. His research interests include: advanced heat transfer and thermal-hydraulics in fission and fusion nuclear plants; nuclear safety, magneto-hydrodynamics; two-phases heat transfer and flow; design of components and systems for energy production plants.

Link to the Webinar

Funded by the European Union

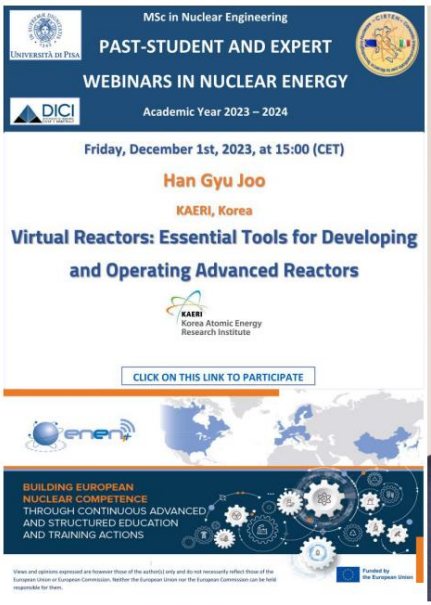
Webinar by Frédéric Plas on Friday November 24, 2023 at 15:00

Frédéric Plas is civil engineer in applied geosciences with a higher education diploma in mechanics and hydraulics, Mr. Plas began his career in the 1980s at the CEA in a research laboratory on material for radioactive waste disposal. He joined Andra, the French national agency for radwaste management, in the 1990s in the scientific division. Since more than 30 years, various managing positions allowed Frédéric Plas to become an expert in deep geological disposal of radwaste and radwaste management in general, covering different areas: design concept, safety assessment and Performance Assessment, a wide range of scientific disciplines (geosciences, materials sciences, radiochemistry, applied mathematics...), Spent fuel cycle and radwaste conditioning.
Head of the Research and Development Division of Andra during 10 years since 2022, he is now the head of the Cigéo program division in charge of instruction of Construction licensing application of Cigéo projet (industrial center for geological disposal of most radioactive radwaste), and the programmatic and technical authority for the development of Cigéo projet.

Link to the Webinar

Funded by the European Union

Webinar by Han Gyu Joo on Friday December 1, 2023 at 15:00



Dr. Han Gyu Joo has been serving as the President of Korea Atomic Energy Research Institute (KAERI) since December 2022. He is on leave from his professorship at Seoul National University where he had served as a Professor of Nuclear Engineering for 18 years. He got his Ph.D. in Nuclear Engineering from Purdue in 1996. During his 4 and half year stay at Purdue including the postdoc period, he developed the initial version of the PARCS (Purdue Advanced Reactor Core Simulator) code which is now being used worldwide through the NRC framework. After returning to KAERI, he led the development of a Numerical Nuclear Reactor based on the DeCART direct whole core calculation code. After moving to SNU in 2004, he broadened his expertise in computational reactor physics and developed many neutronics codes as well as a core thermal hydraulics code with his students. He was inducted as a Fellow of the American Nuclear Society in 2015. He is also an inducted member of the National Academy of Engineering of Korea.

Link to the Webinar

Funded by the European Union

Webinar by Jacopo Buongiorno on Friday December 15, 2023 at 15:00

Jacopo Buongiorno is the TEPCO Professor of Nuclear Science and Engineering at the Massachusetts Institute of Technology (MIT), the Director of the Center for Advanced Nuclear Energy Systems (CANES), and the Director of Science and Technology of the MIT Nuclear Reactor Laboratory. He has published over 100 journal articles in the areas of reactor safety and design, two-phase flow and heat transfer, and nanofluid technology. For his research work and teaching he won several awards, among which recently the 2022 ANS Presidential Citation. Jacopo is a consultant for the nuclear industry in the area of reactor thermal-hydraulics, and a member of the Accrediting Board of the National Academy of Nuclear Training. He is also a Fellow of the American Nuclear Society, a Fellow of the NUclear Reactor Thermal Hydraulics (NURETH) conference, a member of the ASME, past member of the Naval Studies Board (2017-2019), and a participant in the Defense Science Study Group (2014-2015).

Link to the Webinar

Funded by the European Union

Webinar by Stefano Monti on Friday December 22, 2023 at 15:00

Stefano Monti is currently President of the Italian Nuclear Association and Director of Research at ENEA, the Italian National Agency for New Technologies, Energy and Sustainable Economic Development. From May 2011 to November 2022, he was Head of the Nuclear Power Technology Development Section of the International Atomic Energy Agency (IAEA). Before joining the IAEA, he was Head of the Division Reactor and Fuel Cycle Safety and Security Methods of ENEA and from 2007 to 2013 President of SIET, a world leader company in the experimental tests for the development, testing, qualification and certification of systems and components for the nuclear industry.

Link to the Webinar

Funded by the European Union

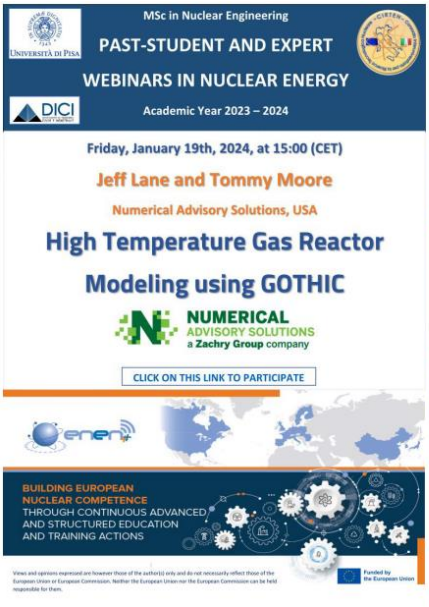
Webinar by Yves Desbazeille on Friday January 12, 2024 at 15:00

Yves Desbazeille – Director General, nucleareurope
Yves Desbazeille is French and graduated in electrical engineering from the Ecole Supérieure d'Electricité ("SUPELEC") in France in 1991 and studied on an MBA program in the early 2000s. During his successful career, he has been involved in different businesses and responsibilities at EDF: nuclear engineering, hydro and thermal power projects management in France, USA as well as in Asia, where he was for 5 years. His previous position as EDF representative for energy in Brussels has provided him with an in-depth knowledge of the EU institutions and Brussels' stakeholders and of the energy and climate stakes for Europe.
nucleareurope is the Brussels-based trade association for the nuclear energy industry in Europe. nucleareurope acts as the voice of the European nuclear industry in energy policy discussions with EU institutions and other key stakeholders. The membership of nucleareurope is made up of 15 national nuclear associations.

Link to the Webinar

Funded by the European Union

Webinar by Jeff Lane and Tommy Moore on Friday January 19, 2024 at 15:00



Dr. Jeff Lane is the Technical Director for Numerical Advisory Soluons (NAS). His background is in software development, computaonal thermal-hydraulics and reactor safety analysis for both exisng LWRs as well as next generation SMR and non-LWR concepts. His primary responsibility is the GOTHIC coarse-grid CFD software, but he has also been involved with development of digital twins, the application of machine learning to guide simulaons, accident management and data-driven modeling. Dr. Lane received his Ph.D. from Pennsylvania State University where he studied under the Rickover Fellowship Program in Nuclear Engineering.

Dr. Tommy Moore has 10 years of experience in the nuclear field with a focus on experimental and computational thermal hydraulics, computational fluid dynamics, reactor safety analysis, and reactor design. Dr. Moore recently earned his PhD in nuclear engineering from Oregon State University where he worked on the High Temperature Test Facility as a test engineer, taught the introductory thermal-fluids courses, and performed a Star-CCM+ benchmark for a transient sodium-cooled fuel test in support of the Transient Reactor Test Facility restart.

Link to the Webinar

Funded by the European Union

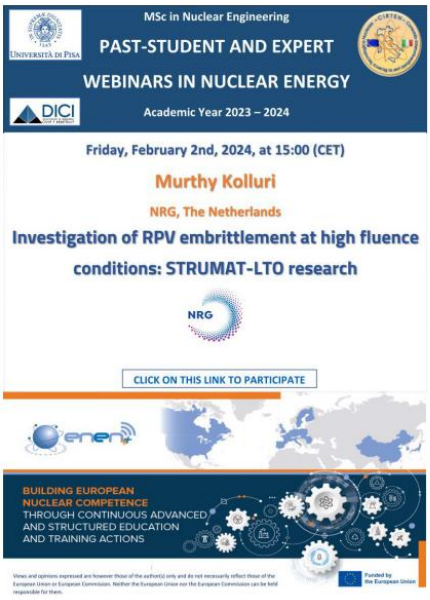
Webinar by Gonzalo Jiménez on Friday January 26, 2024 at 15:00

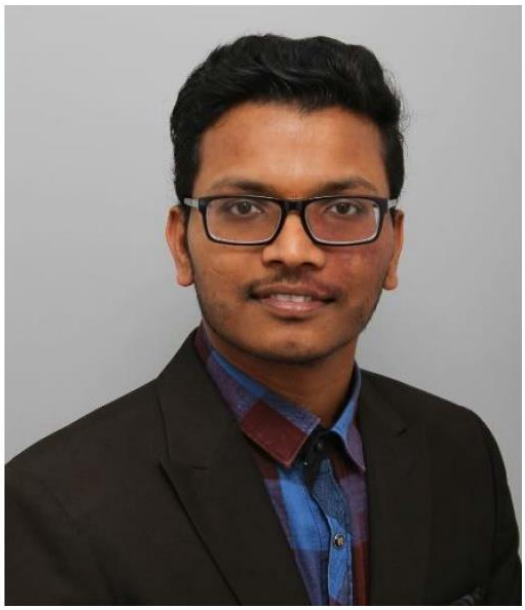
Gonzalo Jimenez has a PhD in Nuclear Engineering by the Universidad Politécnica de Madrid (UPM). He has worked and researched in nuclear safety since 2005 within engineering companies such as Naturgy and Westinghouse Electric Company in Spain and Belgium. From 2011, he is Associate Professor in the Energy Engineering Department of the UPM.
His main fields of research are Nuclear Safety and Thermal Hydraulics, specially spent fuel dry cask simulation and containment analysis. He has worked in several European projects such as ESFR-SMART, ENEN+, PIACE and others. Nowadays, he is responsible of several research projects with Spanish Nuclear Power Plants and with the Spanish Nuclear Regulatory Body. From 2020, he is coordinator of the AMHYCO European project. He has published more that 40 indexed papers and he has directed 7 PhD thesis.
On the other side, he has a Master in Spanish and Latin-American Literature, and he is currently doing a PhD thesis on Spanish contemporary poetry.

Link to the Webinar

Funded by the European Union

Webinar by Murthy Kolluri on Friday February 2, 2024 at 15:00



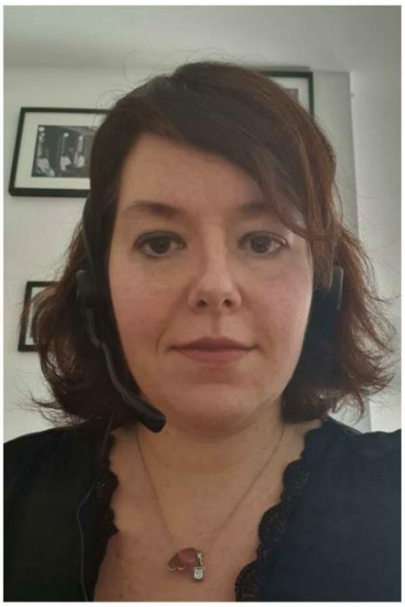


Murthy Kolluri finished his PhD in Mechanics of materials (TU Eindhoven, Netherlands) in 2011. Since then he is working as a research scientist within Research and Innovation department at NRG, The Netherlands. His research interests include neutron irradiation effects on mechanical and microstructural properties of structural nuclear materials, in particular irradiation embrittlement in RPV steels. Additionally, he is involved in surveillance testing program of HFR Petten. He is the project manager and lead scientist of NRG's multi-annual research program, STRUMAT, focused on studying irradiation embrittlement of RPV steels for safe long term operation of LWRs. He is also scientific coordinator of the STRUMAT-LTO project funded by H2020.

Link to the Webinar

Funded by the European Union

Webinar by Lucia Sargentini on Friday February 9, 2024 at 15:00



Dr. Lucia Sargentini is a research-engineer at Commisariat à l'Energie Atomique et aux Energies Renouvables (CEA) in Saclay. Since 2015 she has been involved in safety studies for CEA's research reactors, in experimental analysis for physical modelling and validation of T-H system codes and in the inverse uncertainties quantification in Best-Estimate Plus Uncertainty methodologies. She graduated in Nuclear Engineering at University of Pisa in 2011, after an intership at CEA-Saclay on heat transfer transient during reactivity accident in research reactors. She holds a PhD (2014) in Fluid Mechanics at Université Pierre et Marie Curie (UPMC) in Paris on fluid-structure interaction for sodium reactor assemblies.

Link to the Webinar

Funded by the European Union

Webinar by Filippo Gagliardi on Friday February 16, 2024 at 15:00

Filippo Gagliardi has a master's degree in physics of fundamental interactions earned at University of Pisa, Italy, in 2013. After few experiences in high-energy experiments (CMS, AMS) at CERN, he joined the Italian company Nucleco spa. Currently he is responsible of the non-destructive characterisation systems of the company. He has gained a deep experience in practical applications and theorical studies of many non-destructive techniques for radiological characterization in a large variety of cases, in Italy (included, but not limited to, all nuclear installations) and abroad (like the Joint Research Center – JRC – in Karlsruhe, Germany).
He is involved in several international projects and gives lectures and seminars for university courses or for private entities. Since 2021, he is involved (as student) in the PhD programme in nuclear engineering with La Sapienza – University of Rome, Italy: his R&D work focuses in 2D and 3D gamma-ray imaging techniques.

Link to the Webinar

Funded by the European Union

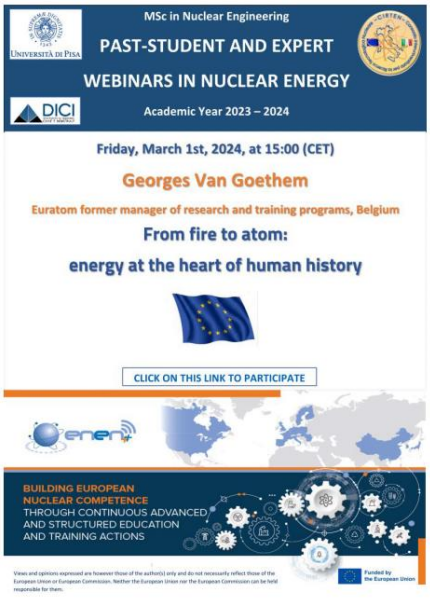
Webinar by Michele Frignani on Friday February 23, 2024 at 15:00

Michele Frignani entered Ansaldo Nucleare in 2007 and is currently Head of Innovation for the nuclear sector. He covered multiple roles in the company, from **technical coordination** to **management responsibilities** of increasing complexity. He is now responsible of the **strategic plan**, including the interface and synergies with the companies of the Group.
With **15+ years** experience in the nuclear field and 10+ years in coordination of innovative projects, he devoted most of his carrer in bridging the gap between academia and industrial sector, with a focus on the management of engineering and testing programs for advanced reactor concepts and small modular reactors.
He has a **PhD in Nuclear Engineering** at University of Bologna, and recently attended the Key Manager High Education program by CdP Academy at SDA Bocconi, Headsprings and IESE Campus. With more than **30 publications** in journals, he is also invited speaker at various international events on energy and nuclear technology.

Link to the Webinar

Funded by the European Union

Webinar by Georges Van Goethem on Friday March 1, 2024 at 15:00



Georges VAN GOETHEM is a mechanical civil engineer (UCLouvain Polytechnic, 1974). He then completed a doctorate in fluid mechanics applied to nuclear safety (1979). He worked for Belgian industry for several years. He then spent his entire career in international nuclear fission research at the European Commission - more specifically at Euratom. He spent the first half of his career at the Joint Research Centre in Ispra, Italy, and then in Brussels at DG Research and Innovation, Directorate for Energy, in charge of the Euratom framework programme (safety, radiation protection, waste management). He has launched a number of nuclear education and training programmes as part of the Erasmus programme.

He also initiated a number of scientific collaborations in Europe and abroad on issues relating to the energy mix (i.e. composed of renewable, fossil and nuclear sources). His teaching at the Collège Belgique (Royal Academy of Belgium) focuses on innovation in the nuclear field (Generation IV and SMRs). He also lectures in France at the Ecole des Mines de Nantes and at the Université de Reims Champagne-Ardenne. Finally, he gives a series of lectures on the energy mix at the Université des Aînés (UDA) of UCLouvain on the campuses of Brussels-Woluwé and Louvain-la-Neuve.

He is also a reviewer of the IPCC reports - in particular, Working Group no 3 (i.e. climate change mitigation) - whose sixth report came out on 4 April 2022. He is a member of the "Académie Royale des Sciences d'Outre-Mer de Belgique". As such, he works on issues relating to "access to energy for all" (SDG no 7) in Africa. In his spare time, he leads various citizens' groups concerned about the future of energy in Belgium. He is co-founder of the bilingual Belgian association "100 Terawatthours", which interacts with citizens, the relevant political authorities and the media.

Link to the Webinar

Funded by the European Union

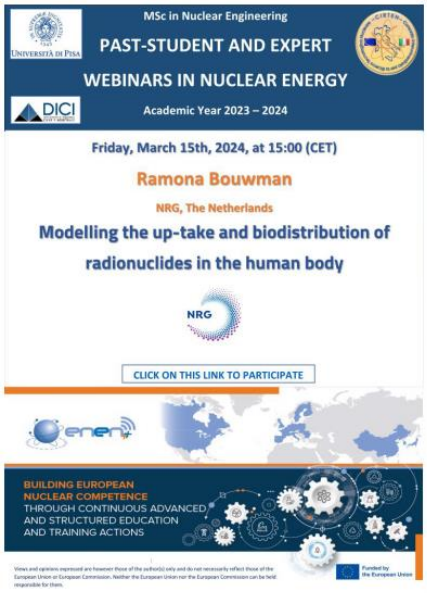
Webinar by Marco Pellegrini on Friday March 8, 2024 at 15:00

Marco Pellegrini has been working as Project Associate Professor since 2019 in the Nuclear Professional School at the University of Tokyo. Marco obtained his Ph.D. at the Tokyo Institute of Technology in March 2012, almost one year after the accident at Fukushima Daiichi Nuclear Power Station. His research and expertise encompass Severe Accidents phenomenology, focusing on multi-phase flow with Computational Fluid Dynamics (Eulerian-Eulerian method and VOF) and experimental approaches (e.g. PIV, aerosol-spectrometry).
He has worked from 2012 to 2019 for the Fukushima Decomissioning Project as a researcher at the Institute of Applied Energy in support of TEPCO for the investigation of the accident progression, debris and fission product distribution at the plant. He has served as leader and technical expert of various OECD/NEA projects such as the BSAF-I, BSAF-II, ARC-F and currently the FACE project. Additionally, he serves as task leader of the CFD package of the IPRESCA/NEUGENIA project on pool scrubbing.

Link to the Webinar

Funded by the European Union

Webinar by Ramona Bouwman on Friday March 15, 2024 at 15:00



Ramona Bouwman finished her PhD in medical physics (University of Amsterdam) in 2017. Since 2018 she is working as a radiation protection consultant at NRG in Arnhem, the Netherlands. In this postiion she gives advice on regular aspects regarding the safe use of ionizing radiation and she is involved in research on radiation protection questions. Her main research topics are related to the biodistribuon of radionuclides in the human body. Addionally, she is leading the task on internal dosimetry of therapeutic radiopharmaceuticals of working group 7 (internal dosimetry) of the European Radiation Dosimetry Group.

Link to the Webinar

Funded by the European Union

Webinar by Luka Snoj on Friday March 22, 2024 at 15:00

Luka Snoj received the Diploma and PhD thesis in Physics from the Faculty of Mathematics and Physics, University of Ljubljana, Slovenia in 2005 and 2009, respectively. In 2010, he was on 6 months postdoctoral position at Culham centre for Fusion Energy, where he was charge of neutron transport calculations to support JET neutron yield calibration. In 2010 has been appointed head of TRIGA reactor at the Jozef Stefan Institute (JSI). Since 2014 he has been head of reactor physics division at the Jozef Stefan Institute. He is very active in teaching; reactor and radiation physics, experimental reactor physics at the Faculty of mathematics and physics where in 2019 he was elected associate professor. He has been advisor to 13 master and 4 PhD theses and is advisor to 4 PhD students. His research interest is mainly theoretical reactor physics related to practical applications in power and research reactors, in particular: Monte Carlo transport of neutrons and photons in fission and fusion nuclear reactors, integral reactor experiments, criticality experiments and calculations. He regularly performs evaluations and evaluation reviews of critical and reactor physics experiments for International Criticality Safety Benchmark Evaluation Project (ICSBEP) and International Reactor Physics Experiment Evaluation (IRPhE) Project working groups under OECD/NEA.

Link to the Webinar

Funded by the European Union

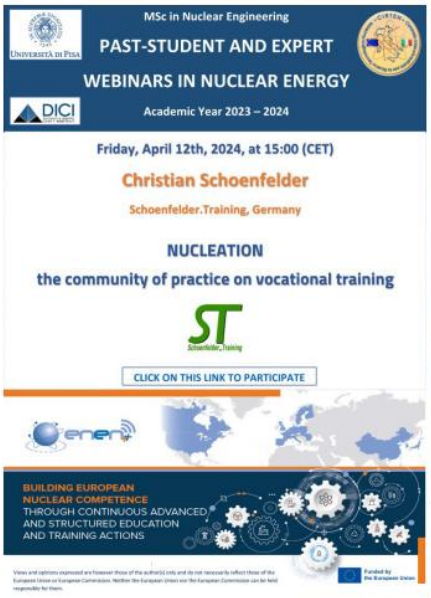
Webinar by Yannick Le Tonqueze on Friday April 5, 2024 at 15:00

Yannick LE TONQUEZE, 50 years old, got a master´s diploma in Nuclear Engineering from INSTN (France). He joined CEA in 1999 in Research reactors division in Grenoble, during 4 years he managed characterization and dismantling of Reactors diagnostics and irradiation loops, Fission products and tritium labs with on field experience. In 2003, he decided to move in LMJ project near Bordeaux in the CEA military branch. He worked 3 years, as Nuclear Safety engineer, in integrated team with key Companies to develop LMJ systems following strong system engineering approach. Then, he became the Nuclear safety manager for all the project and prepare a major Safety report who was presented to the Nuclear authority. In 2009, he got the opportunity to become IFMIF architect, working with Japanese compagnies, and Nuclear Safety coordinator in Japan during 3 years. Then in 2012, He came back in France in CEA Cadarache to become RES (Nuclear Submarine test facility) deputy Project leader to finalize the facility who is now under operation. Finally he joined ITER in 2016, first in Integration division and quickly ITER DG asked him to be in charge of Nuclear Integration Unit, to manage ITER Radiation safety challenges, who is now the Radiation Safety and Environment Unit that he is leading since 2019.

Link to the Webinar

Funded by the European Union

Webinar by Christian Schönfelder on Friday April 12, 2024 at 15:00



Dr Christian Schönfelder, a theoretical physicist, has more than 25 years' experience in training of nuclear engineers, nuclear power plant operators, and maintenance personnel, working in companies such as Siemens, Framatome, and AREVA. Amongst others, he was responsible for designing and implementing the comprehensible training program for the operation and maintenance staff of OL3, the EPR that recently started its commercial operation in Finland. For several years now he has been working as a Senior Training Consultant, active in particular in nuclear Education and Training projects funded by the European Union.

As the German AREVA training center manager, he not only was the member of a community of practice of German training center managers, but also nourished the relation, cooperation and communication between the different AREVA internal training centers as well as the national HR departments.

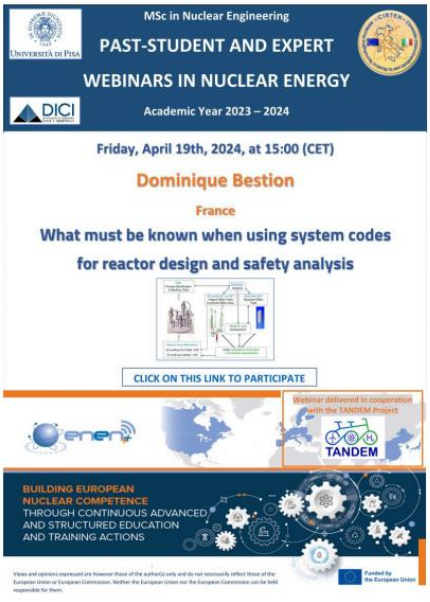
Currently, in the project ENEN2plus (Building European Nuclear Competence) Christian is managing work package 4: Development of Sustainable Vocational Training Program and Network. Here, one task deals with the creation and operation of a community of practice on vocational training.

Christian is not only a member of the German (KTG) as well as of the Spanish Nuclear Society (SNE), but also a member of ENEN (European Nuclear Education Network) as well as of FuseNet, the European Fusion Education Network. Furthermore, in the Management Board of the Fusion Industry Innovation Forum that consults the European Commission, he is responsible for the topical area Skills Development.

Link to the Webinar

Funded by the European Union

Webinar by Dominique Bestion on Friday April 19, 2024 at 15:00



Dr Dominique Bestion has been working at Commissariat à l'Energie Atomique for 37 years (1983-2020), in a thermal-hydraulic department at CEA-Grenoble, in France. He has been working in modelling two-phase flow for the CATHARE system code for accidental transient simulations and has been project manager of the CATHARE code development. He analysed many experiments and developed several models. He became Research Director and International Expert in reactor thermalhydraulics. He contributed to many European projects and had a coordination role for the EUROFASTNET, NURESIM, NURISP, and NURESAFE projects for a European multiscale thermalhydraulic simulation platform. He had teaching activities in several Universities and international courses and published chapters of books. He contributed to OECD-NEA-CSNI-WGAMA activities, coordinated Task Groups on application of CFD to Nuclear reactor safety and co-founded the biennial CFD4NRS workshops. He contributed to OECD-CSNI State of the Art documents on Scaling, and on 3D system code modelling. He has been Editor at the Nuclear Engineering and Design Journal (2008 to 2021). He has been nominated ''NURETH Fellow'' in 2017. He is now consultant, scientific advisor and he chairs the FONESYS international network of system code developers to further improving the quality of reactor thermalhydraulic simulation. His domain of expertise includes two-phase thermalhydraulics, model development, code development and validation, application methodologies of codes for reactor transient analyses and nuclear safety.

Link to the Webinar

Funded by the European Union

Webinar by Koroush Shirvan on Friday April 26, 2024 at 15:00

Pr. Koroush Shirvan is a professor of nuclear science and engineering at Massachusetts Institute of Technology and the current Co-Director of Reactor Technology Course for Utility Executives by National Academy for Nuclear Training, Director of Accident Tolerant Fuel Integrated Research Project (IRP) and PI of MIT ARC-20 project as part of the Advanced Demonstration Reactor Program. His research focuses on innovations in reactor design and fuel engineering.
In 2021, Prof. Shirvan released the first open-source tool for cost estimation of existing and advanced nuclear architectures. The tool and its insights are currently utilized by policy makers and energy community worldwide. He is an active consultant to the nuclear industry on matters of digital engineering, cost, safety, use of AI/ML, and fuel technology.
Pr. Shirvan received his PhD from MIT in 2012. He has been the lead supervisor of over 50 graduate thesis and current is supervising 17 graduate students. His work on fuels has led into multiple awards including the Reactor Technology Award from American Nuclear Society in 2022.

Link to the Webinar

Funded by the European Union

Webinar by Giorgio Simonini on Friday May 3, 2024 at 15:00

Giorgio Simonini joined EDF R&D as Research Engineer in 2015. Since then, he has been involved in a multitude of projects whose *leitmotif* is improving the techno-economic performance of existing and future nuclear power plants (SMR, EPR2). Its expertise is focused on thermal-hydraulic modeling at a system level (i.e. 0D/1D modeling; he is one of the main contributors to the development of the Modelica library ThermoSysPro) and on processing of experimental data coming from the nuclear fleet (visualization, statistics, machine-learning). Digital twins, secondary chemistry monitoring, efficiency monitoring, passive safety systems, core flexibility, hydrogen, coupling of AI and physical models are some of the topics on which Giorgio contributes. He also animates some training at EDF or at the INSTN.
Giorgio graduates in Energy Engineering at the University of Pisa in 2008, after a internship at Westinghouse Nuclear (USA) on CFD analyses on the IRIS SMR. He pursued his specialization in the nuclear domain with a PhD at the CEA-Cadarache on the tempo-spatial representativeness of specific experimental data for a nuclear physics code validation. He also worked at Framatome on the development of new simulation tools for Safety Studies.

Link to the Webinar

Funded by the European Union

Webinar by Bogdan Buhai on Friday May 17, 2024 at 15:00

Resume

Dr. Bogdan Buhai

born on 21.09.1977 in Dej, Romania

Education

04/1990 -09/1997	Graduate at the Technical University of Cluj-Napoca with a Master Degree. Major course of study: Applied Sciences – Physical Engineering.

Professional activity

12/2001 – 03/2007	**University of Ulm, Germany** Scientific employee at the Division for Nuclear Magnetic Resonance, University of Ulm, Germany. PhD Thesis: „ Electrohydrodynamic investigations of fluids in complex systems by NMR mapping experiments and computer simulations “.
since 4/2007 **1/2007 – 06/2012**	**Framatome GmbH** **Training Center Offenbach** Referent by AREVA NP GmbH Development of the training concept for classroom trainings Experience in co-founded EU Educational Projects Invited EU expert for development of a Job Taxonomy for Nuclear Industry
06/2012 – 06/2014	**OL3 New Build Construction Site** Project Leader OL3 Simulators with following activities: • Specification of Training Requirements for Training Simulators and Tools • Development of Validation and Verification Programs for Training Simulators • I/O Interfaces, Process Oriented Simulations and Tools • Development, Implementation and Evaluation of Training Programs with Simulator
07/2014 – 6/2016	**Training Center Offenbach** Deputy of Training Center Department and Simulator Expert
7/2016 – 11/2016	**OL3 Construction Site** Project Leader OL3 Simulators with following activities: -Simulator Validation and declared Ready for Training on 15.10.2016.
12/2016 - now	**Training Center Framatome GmbH Karlstein** Deputy of Training Center Department and Simulator Expert Project Leader OL3 Simulators for last phase after FLG Training Manager at FRAMATOME Training Centre Qualified Trainer for EPR Technology
Major Areas of Interest:	Nuclear Power Plant Simulators for Licensing of Operators Training Methods and Methodology in Nuclear Training

Link to the Webinar

Funded by the European Union

Webinar by Lorenzo Stefanini on Friday May 24, 2024 at 15:00

Lorenzo Stefanini is a former student of the Università di Pisa. Currently he holds the role of manager and main business developer for the Ageing Management and Long Term Operation division at NRG (AM|LTO), the Netherlands. After a bachelor (2013) and MSc (2015) in Nuclear Engineering at UNIPI Lorenzo joins NRG (2016) as a consultant. At NRG Lorenzo rapidly develops into project management and team management. Over the years he takes over the roles of project manager, maintenance manager at the High Flux Reactor and ultimately team manager for the AM|LTO unit.
A recognized specialist in the field of Ageing Management (AM), since 2021 Lorenzo participates and leads may IAEA AM-related and initiatives all over the world.

Link to the Webinar

Funded by the European Union

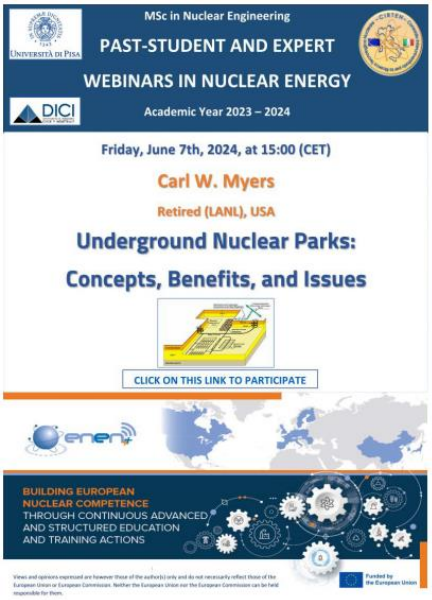
Webinar by Andrea Alfonsi on Friday May 31, 2024 at 15:00

Andrea Alfonsi joined NuCube Energy, Inc. in 2023 and he is currently serving as the Nuclear Core Design Manager. Previously (2021-2023), he was the Nuclear Design and Analysis Functional Manager at Ultra Safe Nuclear Corporation (USNC), in its Advanced Technology division, managing a large multi-disciplinary team of engineers focused on the design and development of nuclear technologies for space applications. Before joining USNC, he worked at the Idaho National Laboratory (INL) for 10+ years (from 2010) covering multiple technical roles, including serving as Technical Leader and Principal Investigator for the development of the Uncertainty Quantification (UQ), parameter optimization and AI-aided Probabilistic Risk Assessment (PRA)code RAVEN (Risk Analysis and Virtual ENvironment) and the Reactor Physics/Neutronics toolkit PHISICS (Parallel and Highly Innovative System for INL Code System).
With 15+ years of experience in the nuclear field (in both Research and Industry environments), he has been involved in research and development of several projects, spanning from reactor design and analysis to methods development for reactor physics applications, reduced order physics/models, advanced uncertainty quantification, etc.
He has a Ph.D. in Energy (Nuclear) Engineering by the University of Rome “La Sapienza” (Italy). In his career, he authored and co-authored more that 20+ journal publications, 60+ papers in proceedings of international conferences, and 40+ technical reports.

Link to the Webinar

Funded by the European Union

Webinar by Carl W. Myers on Friday June 7, 2024 at 15:00



C. W. Myers is an applied geologist with a long-standing interest in underground space applications. He worked for 24 years at Los Alamos National Laboratory in positions that included leader of the geology group, leader of the Earth and Environmental Sciences Division, and co-leader of Los Alamos research for the Yucca Mountain Project. He retired in 2005 to work as an independent researcher. He originated the concept for the underground nuclear park, a method to co-locate underground nuclear power plants and the back-end nuclear-fuel-cycle facilities supporting those power plants, as well as the concept to co-locate underground nuclear power plants with underground hydropower plants. He is a Fellow in the Geological Society of America, a member of the American Nuclear Society, and a member of the International Society of Rock Mechanics "Commission on Underground Nuclear Power Plants." He completed his Ph.D. in Earth Sciences at the University of California, Santa Cruz in 1973 and a Post-Doctoral Fellowship at the State University of Stony Brook in 1974.

Link to the Webinar

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Webinar by Elizabeth Worsham on Friday June 21, 2024 at 17:00

Dr. Elizabeth Worsham is a Systems Integration Engineer at Idaho National Laboratory in Idaho Falls, Idaho. Her work includes modeling and analysis of nuclear heat and power systems and economic analysis of power and product markets. Elizabeth supports the lab's efforts decarbonize the industrial heat and power sector through integration of advanced reactors and SMRs. Specifically, she leads the group investigating decarbonizing pulp and paper mills with nuclear energy. In addition, Dr. Worsham supports international collaborations through the Department of State's Foundational Infrastructure for the Responsible use of SMR Technology (FIRST) as a subject matter expert on non-electric applications for nuclear power. Elizabeth received her bachelor's degree in mechanical engineering from Embry-Riddle Aeronautical University (2017) and PhD in Mechanical Engineering from North Carolina State University (2020).

Link to the Webinar

Funded by the European Union

Webinar by Francesco Ganda on Friday June 28, 2024 at 15:00

Francesco Ganda currently leads the non-electric applications project at the IAEA. The project helps MS with using nuclear plants for things other than electricity, including hydrogen production, district heating, desalination, industrial uses of nuclear heat etc. Prior to that, as a nuclear engineering expert in the IAEA INPRO section, Francesco developed the IAEA FRAMES model to assess integrated nuclear and renewable in modern electricity systems. Before joining the IAEA, Francesco spent a decade in the US National Laboratories, performing neutronic evaluations of advanced reactors and leading the nuclear economics research activities of the US Department of Energy, as part of the programmatic efforts of the system analysis and integration campaign. He holds a PhD and MS in nuclear engineering from the University of California, Berkeley.

Link to the Webinar

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ANNEX 2 – FIRST ISSUE OF THE BULLETIN

BUILDING EUROPEAN NUCLEAR COMPETENCE
THROUGH CONTINUOUS ADVANCED AND STRUCTURED EDUCATION AND TRAINING ACTIONS

ISSUE 01/2023

ENEN#Bulletin
SPRING

Quarterly Newsletter

Funded by the European Union

Contents

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About Us

What is ENEN?

The European Nuclear Education Network, in short ENEN, is an international no-profit association whose mission is "the preservation and the further development of expertise in the nuclear fields by higher Education and Training". This objective is achieved through the cooperation between universities, research organisations, regulatory bodies, the industry and any other organisations involved in the application of nuclear science and ionising radiation.

You can read more on www.enen.eu

ENEN counts more than 90 members across 3 continents and is currently involved in 15 projects funded by the European Commission.

ENEN2plus project in a nutshell

ENEN2plus is coordinated by ENEN and kicked off in June 2022. It is a very ambitious Euratom collaboration action which aims at building European nuclear competences through continuous advanced and structured education and training actions.

About the ENEN2plus project

The ENEN2plus project started as an initiative which should have taken into consideration two major aspects: supporting the providers of the knowledge and supporting the recipients of the knowledge.

When looking at the first aspect, the Project was based on a previously developed project which looked into designing and implementation of Education and Training actions on various nuclear topics. One recent example of such project can be considered (but not limited to) the ANNETTE (https://www.annette.eu/) project which started in 2016 and had its last actions in 2019. During project implementation numerous E&T actions were implemented together with actions aiming at attracting people to the nuclear sector and to reward the efforts made by these young students (e.g. summer schools). While for the second aspect mentioned above, one it is important to remind: the mobility program developed within the ENENplus project. This mobility scheme proved to be a very successful one. Several factors contributed to its success. It is worth mentioning that the mobility scheme under ENENplus, as the one implemented in ENEN2plus addressed the large audience of nuclearists which needed an upgrade on their skills, knowledge or competences, without being necessarily members of the Consortium. The ENENplus project mobility scheme supported with a 950.000 approximative budget, over 600 people in achieving their career goals.

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The ENEN2plus project took the ideas of these projects and moved one step forward. We do aim at implementing successful E&T actions but first we need to have a look at what is expected from the whole community. This is the reason we started an investigation spread across the whole nuclear sector. A major importance is attracting people to the nuclear sector. With numerous nuclear power plants to be built in the near period, the pool of nuclear engineers is very limited. Developing a skilled workforce is highly demanded by the energy sector. This is one good example of a nuclear sector where nuclearists are needed but it is not the only sector. Another good example would be the nuclear medicine which developed exponentially in the last decades and specialists in topics like radiation protection are highly required. New topics like use of nuclear in space or small modular reactors are also considered.

Another important section of the project is dedicated to the vocational education. We look further into getting closer to the needs of the industry thus we assigned a full work package to it. We kept the mobility scheme of the ENENplus project but we upgraded it. The new mobility scheme now is implementing a 2.5M EUR program and by the date of this message we have 217 submitted individual applications, with 329 under preparation. We also have 18 submitted group applications for funding with 15 under preparation. We are also aware that some expertise might not be present on the European continent and we also aimed at identifying what and where this expertise could be present. In this sense we have created a whole work package dedicated to the interaction within extra EU partners in order to implement the proper set of E&T actions that could bring that knowledge also on the European Continent.

Gabriel PAVEL

has been Executive Director of the European Nuclear Education Network for two years. He has completed 2 E&T projects and has 6 projects under implementation. Experience: 16y in the nuclear sector. University Politehnica of Bucharest, Romania (16y); Lecturer on nuclear engineering, radiation protection, non-power applications of ionizing radiation. 5 E&T projects and 24 projects with industry.

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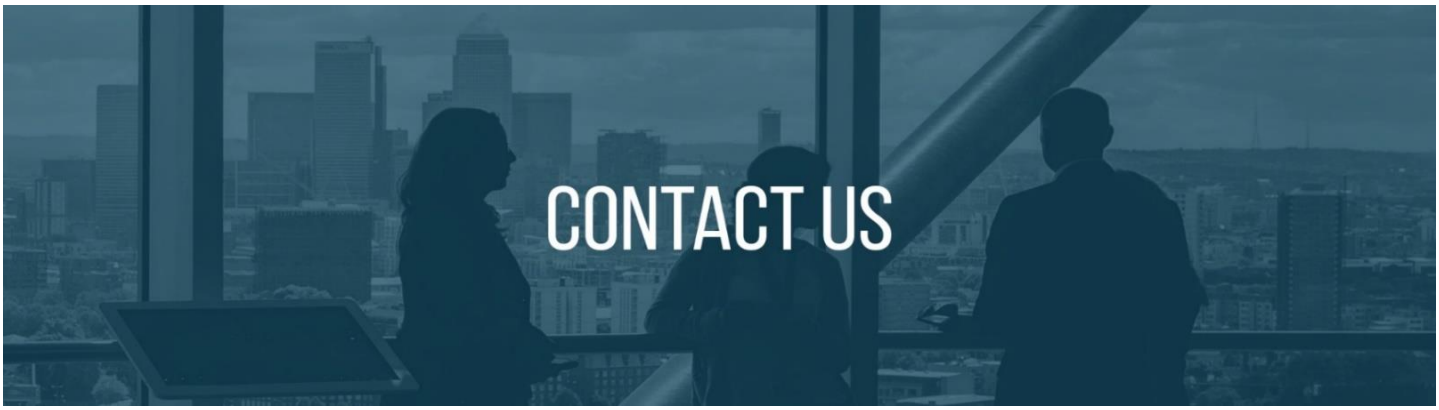

Walter AMBROSINI is Full Professor in Nuclear Plants at the University of Pisa, Italy. His Research interests involve the field of Nuclear Reactor Thermal-hydraulics. He has been President of the Research Doctorate in Nuclear Engineering in Pisa (2008-2016), President of the MSc in Nuclear Engineering in Pisa (2011-2018), President of the European Nuclear Education Network (2013-2016), Member of the ASN Commission for Energetics and Nuclear Engineering (2018-2021), Present Member of the CDs of CIRTEN and of the Associazione Italiana Nucleare (AIN). His relevant Memberships: AIN, ENS, ANS, ASME.

Roberta CIRILLO is working as Project Manager and Communication Officer at ENEN. She is responsible of all ENEN communication channels, manages several EU-funded project leading the Dissemination and Communication working package and acts coordinator for the TOURR project. Physicist and Nuclear Engineer by training, she complemented her education with Energy Management and Innovation & Business Creation courses.

Csilla PESZNYÁK is Medical Physics and Radiation Protection Expert in Hungary. Associate professor at Budapest University of Technology and Economics. Head of Radiation Protection Service at National Institute of Oncology, Hungary. President of the ENEN aisbl. President of Health Physics Section, Roland Eötvös Physical Society. Board member of Hungarian Society of Medical Physics and next president of Hungarian Radiation Oncology Society.

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Štefan ČERBA graduated from the Slovak University of Technology in Bratislava (STU) in the degree course nuclear engineering. He worked at the Korea Atomic Energy Research Institute (KAERI) and as an expert advisor for the Slovak Nuclear Regulatory Authority. Currently he works as a senior researcher at STU where he is involved in research activities related to reactor physics, radiation protection, numerical simulations, and nuclear data. He is also involved in the education process through subject such as reactor physics, NPP decommissioning, materials for NPPs and computer network. He is involved and responsible for the implementation of several national and international projects, he is a task leader in ENEN2plus and communication manager in ENEEP. He is also a chairman of the NURECO – Nuclear Research Community civil association and the chairman of the Supervisory Board of the B&J NUCLEAR research spin-off company.

Enikő KOSZTA is a young Medical Physicist in Hungary She has received her master degree from the University of Technology and Economics, Budapest. She has been working in the National Institute of Oncology in Budapest since 2020. She is a member of the Hungarian Society of Medical Physics, the Hungarian Society for Radiation Oncology and the European Society for Radiation Oncology

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Focus

ENEN2plus MOBILITY PROGRAM

ENEN2plus comes with the largest mobility action to date in the nuclear education and training field. Two and a half million Euros have been devoted to a strong mobility program devoted to enhance EURATOM competences through mobility opportunities, including access to world-class infrastructure and job perspectives.

The goal is to support 1000 learners with cross-borders and cross-disciplinary mobility within and beyond EU. A comprehensive Mobility Manual has been published HERE and a dedicated mobility platform has been established HERE.

The Mobility manual outlines the rules and procedures for the applications, evaluations, selections and delivery of the mobility grants within the ENEN2plus project.

The mobility grants are intended primarily for students and early career professionals (up to 10 years of experience), who are aiming to advance the knowledge, skills, experience etc. The grant is intended to enable or improve the nuclear career of the applicant.

- ☑ Both individual and group applications are supported.
- ☑ Recommended individual actions include: internships, on the job trainings, study and/or research exchanges, active participation in a research conference and training courses.
- ☑ Recommended group actions include competitions, workshops, training courses, summer schools, training camps and conferences.

Mobility grants are in principle provided as lump sums directly to the selected applicants and are intended exclusively to cover mobility (transportation and subsistence) costs and access or registration fees.

Leon CIZELJ

Head of Reactor Engineering Division, Jožef Stefan Institute, Slovenia. Responsible for the strategic and operational leadership of research, postgraduate education, technical and scientific support to the Slovenian nuclear regulatory body division. Professor of Nuclear Engineering, University of Ljubljana, Slovenia. Past president of the ENEN aisbl. President of the European Nuclear Society

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Event Schedule 2023

Belgian Nuclear Careers Day

(March 6 - 7, 2023)

The SCK CEN Academy organized the 4th edition of the Belgian Nuclear Careers Day, with the support of the ENEN2Plus project. An in-person event was held in Brussels where about 100 participants heard about possible advanced studies and career opportunities in nuclear industry, healthcare, research centres and governmental organisations. To explore the workfloor, technical visits to Westinghouse, ENGIE-Tractebel and the university hospital in Leuven were organized. The in-person event was preceded by online speed dating. 82 participants, a mix of recruiters, students and junior professionals, were able to have 207 meetings in total.

Thank you ENEN, ENS, Thomas Thor, Agoria, FANC, BelV, NIRAS, EC JRC Geel, The Binding Energy, Rad4Med, ENGIE-Tractebel, Framatome, GE HealthCare and Westinghouse Electric Company for joining us in this event!

ENS Webinar

(30th March, 2023)

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ENYGF KRAKOW
(8-12 MAY, 2023)

Curious about inspiring opportunities and paths
that the nuclear sector offers in several fields? Join us at ENYGF2023!

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Don't miss a Nuclear Careers Day rich in workshops, meetings, and networking opportunities. HR professionals from several companies are waiting for meeting you in Krakow!

Programme

10:00am Welcome to Nuclear Careers Day

10:30 - 12:30am
Speed Dating with Companies & Recruiters

11:30am – 1:00pm
Workshop I
"How to start in a new country?"

1:00 - 2:00 pm Walking Lunch & Networking Opportunities

2:00 - 4:00 pm Workshop II
"It is not always about climbing the ladder – Career hints from recruiters"

Register here: www.conftool.net/enygf2023

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3rd European Nuclear Competition for Secondary Schools

3rd EUROPEAN NUCLEAR COMPETITION FOR SECONDARY SCHOOLS

3-7 July 2023

Venue

Budapest University of Technology and Economics (Budapest, Hungary)

Competitors

Pupils currently enrolled in secondary schools in European States and their teachers. Each team consists of two pupils and one teacher.

Task

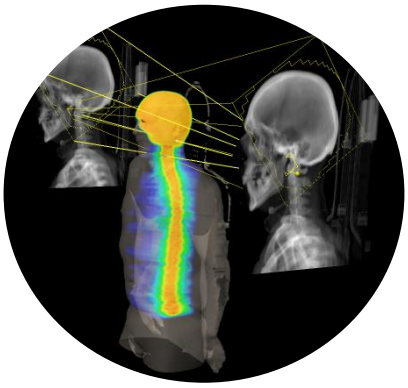
Compose a 3-minute video related to nuclear science (e.g. nuclear energy, radiation protection, medical application, radioactive waste, etc.)

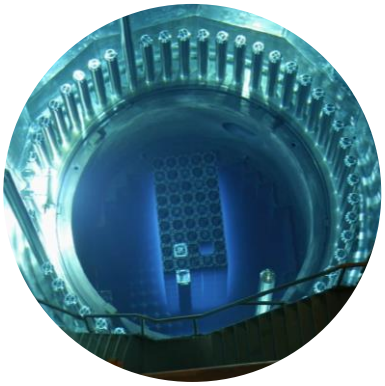
Awards

A total amount of 7500 EUR will be granted at the competition. Nuclear science camp for finalists of the video competition.

Nomination of 15 finalist teams
10 May 2023

Video submission deadline
17 April 2023





Registration and video upload via website

Contact nuclear.competition@reak.bem.hu

50 videos were submitted from 12 countries - Ukraine, Italy, Spain, Belgium, Romania, Bulgaria, Sweden, Poland, Croatia, Czech Republic, Portugal, Hungary

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Scientific Dating – An Encounter Across Disciplines

Research is becoming ever more collaborative and inclusive. This workshop matches you with scientists from different disciplines with the purpose of sharing insights on, and approaches to, research involving nuclear topics.

Connect and integrate different perspectives and forms of knowledge, stimulate your critical thinking and explore new ways to develop collaborative projects!

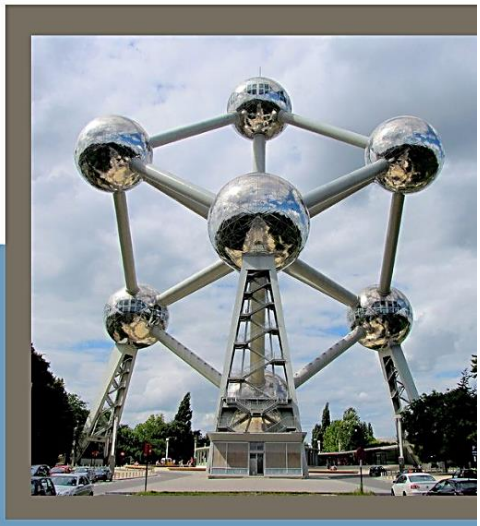
WORKSHOP

SCIENTIFIC DATING
AN ENCOUNTER ACROSS DISCIPLINES

05/10/2023 - 06/10/2023

BRUSSELS, BELGIUM

Are you a MSc or PhD student in natural or social sciences?
Do you have an interest in nuclear science and technology?
Do you enjoy breaking barriers by collaborating across disciplines?



SEND US A MOTIVATION LETTER INCLUDING A SHORT CV TO

ACADEMY@SCKCEN.BE

DEADLINE - MAY 31, 2023

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During two days, participants will:

- Debate about the opportunities and challenges of working across disciplines and with various stakeholders
- Formulate a research problem in a transdisciplinary perspective
- Identify stakeholders and their potential role in the research process
- Explore ways to collaborate outside your own discipline
- Practice how to present your research to a wider audience

Participants will work in small groups on a selected topic of choice, Small Modular Reactors (SMRs), Reuse of NORM (Naturally Occurring Radioactive Materials) residues resulting from industrial processes, Management of nuclear emergencies and post-accident recovery, Management of high-level radioactive waste, Medical applications: mammography screening. More information about the topics will be provided prior to the workshop.

This workshop brings together MSc students, PhD students and junior researchers from natural and social science disciplines with an interest in nuclear science. The aim of the two-day workshop is to stimulate reflection on research topics and practices across disciplinary boundaries in ways that are often overlooked in the training of young researchers. The programme uses a highly interactive approach that stimulates both individual and mutual learning.

This workshop is organised by the SCK CEN Academy in collaboration with SCK CEN's Programme for Integration of Social and Ethical Aspects into Nuclear Research, under the framework of the European Union's Horizon 2020 research and innovation programme under grant agreement 101061677 (**ENEN2plus**). Participation is free of charge, but submission of a duly completed application file is mandatory (see registration info). A joint accommodation plan for all participants will be provided. More information will be available soon.
Contact:

Mrs Aline Van den Houte
Administrative & logistics support
SCK CEN Academy for Nuclear Science and Technology
Tel.: + 32 14 33 88 57

Mr Jakob Luyten
Project collaborator
SCK CEN Academy for Nuclear Science and Technology
Tel.: + 32 14 33 88 55
E-mail: academy@sckcen.be

Jakob LUYTEN

has a teaching degree and a MSc in Chemistry from Catholic University of Leuven. He worked at the Avans University of Applied Science as a lecturer and within the L&D group of Sanofi Geel as site training specialist. He recently joined the SCK CEN Academy.

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Course on the Deterministic Modelling of Nuclear Reactor Multi – Physics

SAVE THE DATE!

11-15 DECEMBER 2023

COURSE ON THE DETERMINISTIC MODELLING OF NUCLEAR REACTOR MULTI-PHYSICS

Registration to the course will open after the summer.
Five onsite participations will be covered by the ENEN2+ mobility fund.

More Information:
Prof. Christophe Demazière
demaz@chalmers.se

A course on the deterministic modelling of nuclear reactor multi-physics is organized by Chalmers University of Technology at the end of 2023. The course deals with the modelling of nuclear reactors, with emphasis on their multi-physics and multi-scale aspects. The course covers neutron transport, fluid dynamics and heat transfer. This course aims at presenting the main algorithms in the computer codes used by the industry and in academia for the macroscopic modelling of nuclear systems. The underlying methods used in such codes, together with their assumptions and limitations, are thoroughly presented, so that the codes could be used with confidence.

Registration to the course will open after the summer. Five onsite participations will be covered by the ENEN2+ mobility fund.

The course is made of two parts: a self-paced learning phase representing about 40 hours of work, followed by an interactive week between December 11-15, 2023, also representing about 40 hours of work. The interactive week is organized in a hybrid set-up (participants can join onsite at Chalmers University of Technology, Gothenburg, Sweden or join online).

Whereas the self-paced learning phase focuses on acquiring the theoretical concepts and testing the participant's understanding, the interactive week focuses on hands-on exercises, during which the

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participants will apply the learned concepts to the modelling of nuclear reactor systems via hands-on exercises.

For more information, contact Prof. Christophe Demazière demaz@chalmers.se

Christophe DEMAZIÈRE

is leading the DREAM task force at Chalmers (Deterministic REactor Modelling). DREAM is a cross-disciplinary group having expertise in neutron transport, fluid dynamics, heat transfer, and numerical methods. The aim of the group is to develop beyond state-of-the-art techniques for modelling nuclear reactors, thus contributing to improved simulations tools and enhanced safety. Prof. Demazière is lecturing in courses on the physics and modelling of nuclear reactors. These courses deal with the multi-physic and multi-scale aspects of such systems. He is a member of the American Nuclear Society.

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Upcoming Webinars

WEBINAR	EVENT NAME
THE UNIVERSITY OF PISA	The ENEN# Weekly Afternoon Webinars. Every Friday!

The program of the webinars planned for this year is available at this link. At the time of writing, the first webinars have been already held, starting with February 2023; anyway, a sufficiently long list is still available, with the **webinars being delivered on Friday afternoons.**

THE UNIVERSITY OF PISA, MEMBER OF CIRTEN, THE CONSORTIUM OF THE ITALIAN UNIVERSITIES INVOLVED IN RESEARCH AND EDUCATION IN THE NUCLEAR FIELDS…

…www.cirten.it, is holding Past-student and Expert Webinars in Nuclear Science and Engineering since early in 2021. At that time, it was felt necessary to find a way to compensate for the loss of scientifically relevant connections owing to the pandemic, thus restoring by the available means the possibility to disseminate knowledge in the nuclear fields, and to have virtually the same experience of a live event. Two series of webinars were held on different nuclear matters, in the academic years 2020-2021 and 2021-2022, obtaining good success, owing to the quality of the delivered lectures that stimulated attendance and interaction among the attendees.

In the frame of the **ENEN# Project,** the initiative has been included in WP3 with the new name of "**Past-student and Expert Webinars in Nuclear Energy**", aiming to constitute a further enlarged forum, with the contribution of all the project partners. The format of "past-student and expert webinars" is aimed to highlight the work in progress by the youngest who, a few years ago, were sitting in the desks of our universities, together with the relevant messages coming from senior researchers and professionals, obtaining a quite interesting mix of ages and levels of experience which provides a rather complete panorama of what is presently ongoing in the nuclear fields. Besides the general subjects already covered in past editions, attention is now devoted to including also "novelties" (e.g., nuclear safety, medical applications, environment, decommissioning, space, etc.), thus covering a broader range of interests. ENEN# Project partners and any qualified Institution can propose to deliver lectures in the benefit of a vast audience of university students at any level and of the general public throughout Europe and abroad.

Please, use this link to reserve for being informed weekly by e-mail about the webinars and send a message to walter.ambrosini@unipi.it and rosa.lofrano@unipi.it for proposing new webinars.

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List of webinars for this year

10 February 2023 15:00	Gabriel PAVEL, Roberta CIRILLO ENEN, Belgium Supporting career paths in the nuclear fields > Recording Available
17 February 2023 15:00	Jadwiga NAJDER and Patricia SCHINDLER ENS-YGN and Women in Nuclear Climate science, solutions and action: nuclear technologies in support of UN Sustainable Development Goals > Recording Available
24 February 2023 15:00	Alessandro PETRUZZI NINE, Italy NINE R&D projects > Recording Available
03 March 2023	General Assembly of ENEN
10 March 2023 15:00	David NOVOG McMaster University, Canada The Silver Bullet Syndrome: Action and Inaction on Low Carbon Energy > Recording Available
17 March 2023 15:00	Daniel FREIS JRC Karlsruhe, Germany Radioisotope Power Systems for Exploratory Space Missions > Recording Available
24 March 2023 14:30	Juha POIKOLA TVO, Finland Olkiluoto 3 - The greatest single act for the climate in Finland > Recording Available
24 March 2023 16:00	Bogdan BUHAI Framatome GmbH, Germany SIMULATORS FOR VALIDATION AND OPERATOR TRAINING > Recording Available
31 March 2023 15:00	Mark ANDERSON University of Wisconsin UNDERSTANDING MULTIPHASE FLOW TO ADVANCE NUCLEAR ENERGY GENERATION > Recording Available
07 April 2023	Merry Easter Vacations!
14 April 2023 15:00	Donato LIOCE ITER ORGANIZATION The ITER Tokamak Cooling Water System > Recording Available
21 April 2023 15:00	Sergio CIATTAGLIA EUROFUSION FUSION POWER PLANT COMPLEXITY AND MAIN POTENTIAL ISSUES > Recording Available
21 April 2023 16:30	Johanna HANSEN Posiva, Finland Spent Nuclear Fuel Management in Finland > Recording Available

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28 April 2023 15:00	Mariano TARANTINO ENEA - Italy LFRs Overview Worldwide > Recording Available
05 May 2023 16:00	Alice D'ONOFRIO C2TN - Portugal Radiopharmaceuticals: How to Exploit Radioactivity for Health Applications
12 May 2023 15:00	Armando NAVA Canadian Nuclear Laboratories Fuel Bundle/Assembly Design using Subchannel Analysis
19 May 2023 15:00	Carlo PARISI Idaho National Laboratory - USA Primary Coolant Apparatus Test (PCAT): an Experimental Facility for MARVEL Microreactor
26 May 2023 15:30	Ronald SCHRAM NRG | Pallas The PALLAS reactor for future medical isotope production and energy research
02 June 2023	National Holiday in Italy
09 June 2023 15:00	Shuisheng HE University of Sheffield - UK TBD
16 June 2023 15:00	Mariano TARANTINO ENEA - Italy Space Nuclear Reactors: Status & Perspectives
23 June 2023 15:00	Govert de WITH NRG|PALLAS Radiological impact of contaminated seawater near Fukushima
30 June 2023 15:00	Sergio ORLANDI ITER ORGANIZATION Lesson Learned on ITER Assembly and Installation
07 July 2023 15:00	Andrea ALFONSI Ultra Safe Nuclear - USNC USNC for space applications: From RTG to Nuclear propulsion systems
14 July 2023 14:00	Gianfranco CARUSO Sapienza Università di Roma Nuclear Desalination

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European Nuclear Education Network

MISSION The mission of ENEN is the **preservation and the further development of expertise in the nuclear fields by higher Education and Training.**

APPLY.ENEN Platform To **apply for education and training courses.**

ENEN PhD Event & Prize It is **co-sponsored by ENEN, the European Commission Joint Research Centre (JRC), and the organizer of an international conference.**

EMSNE Certification The **European Master of Science in Nuclear Engineering** (EMSNE) is endorsed by all ENEN members.

ENEN Newsletter A **quarterly publication with regular updates about projects** ENEN is involved in, news, partners initiatives, etc.

PROJECTS PORTFOLIO ENEN manages European Commission funded projects both as Coordinator and as Consortium Partner. Main activities include:

- Dissemination & Communication
- Exploitation of results
- International Mobility travel fund

Members of ENEN

- **Universities,**
- **Research organizations,**
- **Regulatory bodies,**
- **Nuclear industry**

ENEN welcomes as well, International Members and Partners.

secretariat@enen.eu
Rue d'Egmont 11, Bruxelles 1000 – Belgium
www.enen.eu

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