Interview with ENS PhD Award 2024 Winner

Dr. Chiara Favaretto

*The ENS offers an annual award to recognize an outstanding PhD thesis. The award is organized under the auspices of the **ENS High Scientific Council**, which values excellence, innovation, and originality in scientific research in the field of Nuclear Science and Engineering. For this award, each ENS Member Societies nominates one candidate, who is evaluated by the ENS HSC in a two-steps procedure.*

In 2024, the ENS HSC met in Brussels on April 15-16 and, due to the very high level of the applications, exceptionally decided to select **five out of 12 candidates** to enter the final stage of the contest:

- **Dr Chiara Favaretto** (Switzerland) *"Development of terbium radioisotopes towards clinical theragnostics applications in nuclear medicine"*
- **Dr Nicolò Abrate** (Italy) *"Methods for safety and stability analysis of nuclear systems"*
- **Dr Manon Delarue** (France) *"Development of a characterization method for concrete radioactive waste packages using photofission"*

- **Dr Boglárka Babcsány** (Hungary) *"Development of a finite-element-based reactor physics code system for the solution of the SP3 approximation of the neutron transport equation"*
- **Dr Elizabeth Sharp** (United Kingdom) *"Development of an NDT method for pressure monitoring of special nuclear material containment"*

On 5-6 November 2024, the ENS HSC invited the finalists for a technical tour to the SCK CEN site, in Mol (Belgium), where the group had the unique opportunity to visit the Belgian research reactor BR-2 and the labs for radiopharmaceuticals.

The audition took place at the ENS offices, and after a long debate, Chairman Eric Proust announced that **Dr Chiara Favaretto received the ENS HSC PhD Award 2024** with a prize of 2000 euros. Four other competitors have received the Laureate title.

Dear Chiara,

- *What first sparked your interest in the nuclear field, and what motivated you to pursue a career in this area?*

  What I liked the most about the nuclear field was its incredible **multidisciplinarity**. In particular **the specific field of nuclear medicine offered me the unique opportunity to combine my background** in pharmacy with chemistry and physics, **creating an interesting blend of knowledge and skills**. In addition, what truly motivated me to pursue a career in this area was **the ability to apply this interdisciplinary expertise to make a tangible impact by advancing nuclear medicine**. Contributing to the development of innovative diagnostic and therapeutic tools that improve healthcare outcomes has been a deeply rewarding purpose for me.

- Your award-winning PhD research focuses on terbium radioisotopes for theragnostics in nuclear medicine. *What inspired you to explore this topic?*

  Terbium has isotopes that can be used for both imaging and therapy, making it a powerful tool for personalised medicine, thanks to this incredible potential to combine diagnosis and treatment in nuclear medicine. I was inspired by the prospect of bringing closer to the clinical use an innovative tool that could directly enhance the detection and treatment of diseases, providing patients with more accurate and effective care. This includes **delivering targeted treatments to specific areas, minimising side effects**, and ultimately **improving patient outcomes**, which can be done with terbium-based radiopharmaceuticals. My background in pharmacy and my interest in interdisciplinary science made this the perfect topic to focus on, as it connects research with real-world patient benefits.

- *What are the potential innovations or breakthroughs that your research could bring to the field of nuclear medicine?*

  My research aims to bring innovations to the field of nuclear medicine **using novel radioisotopes like terbium isotopes**. Terbium offers four isotopes of interest for nuclear medicine applications: ^{161}Tb and ^{149}Tb, which are suitable for β^--therapy and α-therapy, respectively, and ^{155}Tb and ^{152}Tb, which are ideal for imaging purposes. By linking these isotopes to the same targeting vector, the resulting radiopharmaceuticals will be chemically identical, ensuring identical biodistribution in humans. This enables the treatment of the same diseased tissues previously identified through imaging and allows for therapy to be tailored based on the diagnostic findings. This concept can enhance **theragnostics** by combining precise imaging with targeted therapy, enabling more personalised and effective treatments. **Optimising production and separation methods for these isotopes could make them more accessible for clinical use**, reducing costs and increasing availability throughout Europe. In addition, by developing sustainable production processes, **my work also aligns with green chemistry principles, reducing waste and promoting safer**

practices. These advancements have the potential to advance patient care by improving diagnostic accuracy, treatment efficacy, and overall outcomes in nuclear medicine.

- Beyond your specific research*, what excites you most about the future of nuclear medicine and its role in healthcare innovation?*

  Nuclear medicine has the potential to transform how we diagnose and treat diseases while also changing perceptions about nuclear science. The field is advancing towards highly personalised medicine, where targeted radiopharmaceuticals can detect diseases early and deliver precise treatments directly to affected areas, reducing side effects and improving patient outcomes. Beyond cancer care, nuclear medicine holds promise for addressing other conditions like neurological disorders and infections, broadening its impact on healthcare. **I'm also inspired by the opportunity to make nuclear science more approachable and understood by the public**, showcasing how it can be a force for good. By improving lives and advancing healthcare, this field has the potential to support the shift of the narrative around nuclear science, helping people see its benefits for humanity. **Being part of such a transformative journey is incredibly rewarding and motivating.**

- *Looking ahead, what exciting projects or collaborations are you currently working on?*

  After completing my PhD in Switzerland, I returned to my home country, Italy, where **I am now focused on establishing the production of innovative radionuclides**. My goal is to bring back the knowledge and expertise I gained during my years abroad and apply it here to locally advance nuclear medicine. Additionally, collaborations between my new institute and the old one will be possible. This work is particularly exciting because it doesn't only **strengthen Italy's capabilities in this field**, but also allows me to contribute to **spreading these advancements** and **making new networks across Europe**. In addition to the technical aspects, **I am**

passionate about working with students and new colleagues, sharing my experience and fostering the next generation of scientists in nuclear medicine. Collaborating with them creates opportunities for fresh ideas and perspectives, which I believe will drive further innovation in this field. **This combination of building infrastructures, transferring knowledge, and mentoring others makes this phase of my career especially fulfilling.**

- *How was your experience participating in the ENS HSC PhD Award competition? Do you have any tips or words of encouragement for future candidates?*

  Participating in the ENS HSC PhD Award competition was a fantastic experience. It gave me the opportunity to connect with amazing people and colleagues while learning from their inspiring and innovative work. The competition fosters networking across generations in the field, which is incredibly valuable, and it's always rewarding to have your own work recognized — this kind of acknowledgment can be a great motivator.
  For future candidates, **my advice is to stay curious and open to new ideas**. Take every chance to meet new people, as there's always so much to learn from others, both professionally and personally. Regardless of the competition outcome, **it's an enriching experience that helps expand your knowledge and growth within the field**.