Summary of the International Research Training Group (IRTG) "*Nuclear Photonics*" at TU Darmstadt and Nat'l Univ. for Science and Technology POLITEHNICA Bucharest

The IRTG addresses the training of junior scientists in the newly emerged, interdisciplinary field of Nuclear Photonics which is defined as a field of science studying photon-induced phenomena on an MeV-ranged, nuclear energy scale. It thereby bridges from photonuclear reactions and the generation of energetic particle beams by present-day high-intensity lasers to their applications in research and commercial technology.

The training program exploits unique capabilities at TU Darmstadt with its facilities for MeV-ranged photon beams at the superconducting electron accelerator S-DALINAC along with its research program at the PHELIX high-intensity laser system at the Darmstadt GSI Helmholtz Centre, and at the National University for Science and Technology POLITEHNICA Bucharest with its research program at the European Extreme-Light Infrastructure – Nuclear Physics (ELI-NP) facility in Magurele featuring two synchronized 10-PW lasers and the VEGA system for the production of quasi-monochromatic γ–ray beams from Laser-Compton Backscattering (LCB), which is under construction. The research projects tackle contemporary challenges for the development of laser-generated particle beams, utilize photonuclear reactions for fundamental nuclear research, and develop detector technology and experimental methods beyond state of the art.

The research training plan of the IRTG embraces the entire scientific production chain of Nuclear Photonics from the fundamental methods for the laser-induced generation of photon- and particle beams and their detection and quantitative characterization to their usage in fundamental research in nuclear science and nuclear astrophysics or for potential technological applications. All research projects expand beyond the current state of the art in three related areas of research:

A. Development of novel laser-generated radiation sources

B. Scientific exploitation of MeV-ranged photon beams

C. Advancement of methodology and instrumentation for Nuclear Photonics

They define the project areas of the proposed research program which is executed in individual research projects of the junior scientists participating in this IRTG. Details are provided in its Establishment Proposal.

This IRTG focuses on the qualification of excellent international junior scientists from natural or engineering sciences who choose a career in Nuclear Photonics for their doctoral studies in an international environment. The qualification program (see Figure) of the IRTG rests on four pillars: Individual project training, professional development, networking, and career support. It is designed to provide clear goals and benchmarks for efficient and successful completion of the doctoral studies. All Members of the IRTG are committed to comply to the common goals of the IRTG and its program.