

Accelerators for hadrontherapy and radioprotection issues

The previous titles include both issues related to the technology of hadron therapy and those related to the biological effects of radiations in order to provide efficient radioprotection measurements. Therefore, they are open to students of any area (e.g. biologists, radiologists, radiotherapists, medical physicists, engineers, physicists) who are interested in:

- The treatment of patients with hadrontherapy (treatment with protons and carbon ions)
- The use of advanced radiological machines using AI models in order to improve the accuracy and efficiency of diagnoses, and the evaluation of the therapeutic response of treatment.
- The development and testing of beam monitors and dosimeters,
- The development of the dose delivery system to improve the scanning technique (for example 4D treatments),
- The verification of the dose delivered to the target
- Major concerns in hadrontherapy in relation to radiation protection
- Studies to improve the accelerators and their ancillary systems that provide particle beams for ion therapy.
- Experimental activities on tissues and cells aimed at investigating the response mechanisms after particle irradiation.
- Cellular and molecular mechanisms of radioresistance after irradiation with carbon ions, the immunostimulatory effects of radiation and the immunosuppressive properties of radiation with high LET and the abscopal effect.
- The evaluation of existing and/or new radiosensitizing agents with high-LET radiation.

The previous projects will be carried out in collaboration with the Indian Institute of Technology in Kanpur (India). The partnership between CNAO and the Indian Institute of Technology Kanpur (one of India's leading institutes in scientific and technological innovation and ranked among the top 5 engineering institutes in India) offers great opportunities to carry out various radiation-related research activities (biophysics, radiobiology, medical radiotherapy research and detector development) in collaboration.

The PhD research activities will be carried out partly at IIT Kanpur (for not less than one year) and partly at CNAO, in Pavia.