From Hadrons to Therapy: Fundamental Physics Driving New Medical Advances

Monday, 5 September 2022 - Friday, 9 September 2022

ECT*

Scientific Programme

Modelling of radiation propagation, effects and radiobiology

Development of radiobiological models for radiation effects in cells.
Monte Carlo simulation of radiation transport in condensed matter on the macro-, micro- and nanometre scales.
Fragmentation and decay models of nuclei.
Radiation damage in biological (condensed matter as well as molecular) systems.
Multiscale modelling comprising ab initio, Monte Carlo and/or radiobiological approaches.

Micro- and nanodosimetry

Experimental devices for micro and nanoscopic distributions of energy deposition.
Assessment of complex damage patterns in subcellular and DNA scales.
Links of micro- and nanodosimetry to biological effects of radiation.
Challenges in monitoring techniques for verification of radiation quality.

Hadrontherapy and associated technologies

Measurement and fundamental understanding of nuclear reactions of ion beams in tissue and their impact on treatment and monitoring.
Application of radioactive ion beams for combined treatment and monitoring.
The role of nanoparticles as radiosensitisers in the enhancement of the relative biological effectiveness and in medical imaging.
Challenges in monitoring and imaging techniques (PET and others) and for verification of ion ranges in tissue.

Targeted radionuclide therapy and associated technologies

Decay channels of radioactive isotopes.
Influence of the environment (condensed matter) in the emission spectra.
Production of novel medical radioisotopes.
Cancer cell targeting and radioisotope delivery.

Radiation sensitisers and enhancers

Use of nanoparticles in radiotherapy.
Use of nanoparticles in hadrontherapy.
Use of sensitisers for imaging techniques.