



M1 Internship in Ion Beam Dynamics

Modeling of a GANIL beamline and study of Ion Beam Dynamics

The GANIL accelerator (*Grand Accélérateur National d'Ions Lourds*) delivers high-energy ion beams for fundamental research in Nuclear Physics and also for interdisciplinary studies. Several experimental areas are available for carrying out experiments, and one of them hosts radiobiology studies linked to hadrontherapy research. Radiobiologists from the CIMAP laboratory have recently expanded their research themes at GANIL to include « Flash » irradiations, using very short irradiation times and high beam intensity. In order to ensure the homogeneity of the beam over a surface of the order of a few cm^2 , radiobiologists need to have detailed and precise information about the characteristics of the incident beam provided by GANIL. These characteristics will serve for detailed modelling of irradiation conditions of cellular models by biologists.

This internship, attached to the GANIL Accelerator Physics Group, aims to model the transport of particles in the experimental area used by radiobiologists in order to extract the physical quantities of interest for their simulations.

The student will have to become familiar with the different types of magnets (dipoles and quadrupoles) used in the beamline and the principles of beam dynamics. These elements will then have to be integrated into the Tracewin software in order to model the entire beamline. The student will also participate in regular discussions with physicist and radiobiologist researchers from the CIMAP laboratory to determine the physical quantities of interest to be extracted from the simulations. Based on the results obtained, new beam optics could be studied to respond more precisely to the need for « Flash » irradiations.

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