

Internship in accelerator physics

Simulink RF modelling of superconducting cavities

SPIRAL2 is a heavy ions accelerator delivering some of the most intense beams in the world. Its heart, a superconducting LINear Accelerator (LINAC) relies on 26 superconducting resonator cavities cooled to -269°C . The operation of SPIRAL2 faces challenges that go beyond the beam itself and extend to utilities like cryogenics and radiofrequency systems. In 2009, a joint R&D program between GANIL and CEA has led to the development of a thermodynamic model of the SPIRAL2 LINAC resulting in a model-based control of the cryogenic system. The purpose of the present internship is to extend the existing model with its radiofrequency (RF) counterpart. This work is based on several past and present R&D efforts that target RF modeling of superconducting cavities in a simplified way. This development will use Simulink/Matlab blocks to ease the coupling with the existing thermodynamic model. During this internship, multi-physics couplings will be assessed and studied.

This internship will take place at GANIL/Caen (France) in the Accelerator Physics Group of the Accelerator Division. There will be regular interactions with technicians and engineers of different disciplines such as automation and control, data acquisition, vacuum, cryogenics and radiofrequency.

Expected skills

- Knowledge of tools such as Matlab/Simulink and Python is required for this internship.
- Electromagnetism, Thermodynamics
- Scientific programming, artificial intelligence, radiofrequency, superconductivity

This work could lead to a doctoral thesis centered around the application of machine learning for accelerators.

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