

Internship in accelerator physics

Machine learning for accelerator cryogenics fault detection

SPIRAL2 is a heavy ions accelerator delivery 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. This model also provides valuable data for learning algorithms for fault detection, classification and preventive maintenance. This internship is aimed for testing the capabilities of such algorithms to detect, classify and prevent faults. This is done through the exploration of different learning and classification methods and different fault models.

This internship will take place at GANIL/Caen (France) in the Vacuum and Cryogenics 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

Tools such as Matlab/Simulink and Python (Pandas, Pytorch, ...) – Thermodynamics – Artificial Intelligence

This work can be pursued by a PhD-thesis

Contact: Adnan Ghribi
GANIL, BP 55027, 14076 Caen France

mail: adnan.ghribi@ganil.fr
phone: +33(0)2 31 45 46 80