



ERASMUS MUNDUS JOINT MASTER IN NUCLEAR PHYSICS

Academic Year 2026/2027

MASTER THESIS PROPOSAL

TITLE: Si-cube characterisation for detection of rare decay modes

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ABSTRACT

(just few lines 5-10 explaining briefly the idea of the proposed work and the place where it will be developed).

Nuclei along the drip lines are characterised by rare composite decay modes, such as β -delayed particle emission and β -delayed fission (β DF), that serve as essential probes of nuclear structure yet remain experimentally elusive. No validated multi-purpose detection platform currently exists to characterise these processes using low-energy radioactive ion beams (RIBs). Therefore, we want to test whether a single detection architecture, a segmented silicon array (Si-cube) coupled with high-purity germanium detectors, can serve as a universal platform for exotic decay spectroscopy, detecting both heavy fission fragments and light charged particles.

In this context, the student will be involved in the recommissioning of the Si-cube setup. This will include simulations with Geant4 combined with practical work in the laboratory. First, the student will perform simulations (eventually, varying the configuration of the system) to estimate the basic properties of the setup (energy calibration, detection efficiency, resolution). Then, the student will get the chance to perform off-line measurements with calibration sources to compare the simulation results with the experimental ones.