

Internship “*ERASMUS MUNDUS*”  
proposal 2018

**Research field:**

**Subject:** Construction and test of a system for the detection of particle-X-ray coincidences for heavy and superheavy nuclei

**Description:**

**A. Framework**

The internship will be prepared in the framework of the research field of very heavy and superheavy nuclei, employing the present GANIL cyclotron facility as well as the new separator-spectrometer set-up  $S^3$ , presently being constructed at the new linear accelerator facility SPIRAL2 at GANIL. It will deal with the preparation, execution and analysis of experiments as well as with the development of photon detection schemes aimed at the identification of the atomic charge  $Z$  of the superheavy species to be produced and studied at the GANIL/SPIRAL2 facility.

**B. Experimental studies**

**i. Multi-nucleon transfer reactions**

An experiment to study reaction dynamics in the reaction  $^{238}\text{U}+^{238}\text{U}$  has been accepted by the GANIL program advisory committee to be performed at the magnetic spectrometer VAMOS in conjunction with the AGATA Ge-detector array and dedicated X-ray detectors. The task of the internship will be the implementation of a test set-up to develop and test X-ray techniques for later application as part of the VAMOS/AGATA detection system.

**ii. Decay spectroscopy of very heavy and superheavy nuclei**

One of the major fields of activity of  $S^3$  will be the study of the nuclear structure of the heaviest nuclear species. The detection scheme will be based on a comprehensive particle and photon detection system in the focal plane of the set-up, including reaction product,  $\alpha$ -particle, electron,  $\gamma$ - and X-ray detection. The development of X-ray detection performed in the framework of the  $^{238}\text{U}+^{238}\text{U}$  experiment to be performed at VAMOS/AGATA shall lead to the integration of these techniques in the focal plane detection system of  $S^3$ .

**C. Educational perspectives**

This internship project is envisaged to be followed up by a Ph.D. project which will deal with the preparation, the execution and data analysis of the  $^{238}\text{U}+^{238}\text{U}$  experiment.

**Expected skills:**

detection techniques (semiconductors germanium, silicon)  
experiment electronics (signal processing) and mechanics  
computing skills (C++, analytic programming)  
team work capabilities  
travelling flexibility

**Contact information**

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