ID de Contribution: **33** Type: **Poster presentation**

PISTA, a new detection system for fission studies in inverse kinematics at VAMOS

More than 80 years after its discovery, a complete description of the fission process remains a challenge. It is a many-body dynamic problem involving both microscopic and macroscopic aspects of nuclear matter. Technological breakthroughs such as the development of Gen-IV reactors and various fundamental aspirations bring motivation for the scientific community to have a better understanding of this mechanism. Moreover, new experimental data on exotic fissioning systems that cannot be probed using direct neutron induced fission are needed to further understand the fission process.

At GANIL, fission studies using the VAMOS++ large acceptance spectrometer combined with ^{238}U beams at energies around the Coulomb barrier allow to populate such exotic fissioning systems. Also, fission induced by transfer or fusion reaction in inverse kinematics allows us to obtain isotopic identification (in mass and charge) of fission fragments. As well, the detection and identification of the target-like residue provide the characterization of the fissioning systems. Such a combination has been shown to be a powerful tool to extract post-evaporation isotopic yields and neutron content (N/Z) that hold the signature of the shell effects at play in the process [1].

Recently, an upgrade of the target-like residue detection systems has been initiated. For this, the new PISTA (Particle Identification Silicon Telescope Array) detector has been developed, this last will be located 10 cm away from the target and will cover angles between 30° and 60°. Allowing one of the fragments to enter VAMOS++ where it will be isotopically identified. PISTA is an array of eight trapezoidal silicon telescope detectors assembled as in a corolla. Each telescope is composed of two single sided silicon detectors, 100 µm and 1000 µm thick. The thickness was chosen to identify light ions up to Oxygen. Target-like nuclei will be identified using (ΔE, E) technique up to Oxygen isotopes, resulting in the characterisation of the fissioning system. The high angular granularity of the detector will allow the reconstruction of the reaction kinematics, thus allowing the reconstruction of the Excitation energy of the fissioning system. An experiment using ^{238}U beam at 6 A MeV impinging on a 100 µm thick ^{12}C target is schedule in June.Thanks to this new detector, isotopic fission yields with high statistics per energy bin of about 1 MeV in excitation energy from 6 up to 20 MeV is expected. In this poster, the different features of this new detection system will be presented. In addition, preliminary results from the experiment scheduled in June will be presented.

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Classification de Session: Poster session - with cocktail and buffet

Classification de thématique: Nuclear Dynamics