Contribution ID: **69** Type: **Poster**

Sub-barrier fusion cross section measurements with STELLA

Tuesday, 20 June 2017 19:30 (2 hours)

The STELLA (STELlar LAboratory) experimental station for the measurement of sub-barrier light heavy ion fusion cross sections has been commissioned at the Androm\‘{e}de accelerator at IPN, Orsay. These measurements can yield both insight into nuclear cluster effects~[1] and the S-factors at energies of astrophysical interest. In particular, ^{12}C+^{12}C fusion was identified as a key reaction on the production route of heavier elements in massive stars during the carbon burning phase, in type Ia supernovae and in superbursts from accreting neutron stars~[2].

Since sub-barrier fusion reactions are strongly hindered by Coulomb repulsion, the experimental determination of these cross sections (∼~nb) is highly challenging. Nowadays, the determination of such cross sections is targeted with coincidence measurements using the so called gamma-particle-technique~[3]. The STELLA setup comprises a set of DSSSDs as well as an array of $LaBr_3$ detectors from the UK FATIMA collaboration (FAst TIMing Array) for charged particle and gamma recognition, respectively. In addition, a rotating target mechanism is developed to sustain beam intensities $> 10\mu$A.

In this contribution, the experimental layout will be introduced in detail with a focus on the design and performance of $LaBr_3$ detection array. Furthermore, the measurement technique will be sketched with first results from the commissioning campaign using ^{12}C beam.

[1] D.~Jenkins and S.~Courtin, Phys. Jour. G 42, 034010 (2015);
[2] L.R.~Gasques \textit{et al.}, PRC 76, 3, 035802 (2007);
[3] C.L.~Jiang \textit{et al.}, NIM A 682, 12 (2012);

Primary author: Prof. COURTIN, Sandrine (IPHC Strasbourg)

Co-authors: Dr MONTANARI, Daniele (USIAS - Universite de Strasbourg, IPHC-CNRS); JENKINS, David Jenkins (University of York); Mr FRUET, Guillaume (IPHC-CNRS/ Universite de Strasbourg, 67037 Strasbourg (France)); Mr MORRIS, Luke (University of York, YO10 5DD York, UK); Dr RUDIGIER, Matthias (University of Surrey, GU2 7XH Guildford (UK)); Prof. REGAN, Patrick (University of Surrey)

Presenter: Prof. COURTIN, Sandrine (IPHC Strasbourg)

Session Classification: Poster session