**European Nuclear Physics Conference 2025** 



Contribution ID: 136

Type: Oral Presentation

## Towards the synthesis of new heavy nuclei: multi-nucleon transfer reactions with 136Xe + 238U

Most of the heaviest nuclei synthesized in recent decades have been obtained using fusion-evaporation reactions. Due to neutron evaporation and the limited choice of beam-target combinations, this mechanism tends to produce mainly neutron-deficient nuclei. In addition, the cross-sections are often small, e.g. 0.5 pb at most for the discovery of 294Og [1]. Multi-Nucleon Transfer (MNT) reactions are therefore expected to be a complementary mechanism to fusion-evaporation. Indeed, according to the theory [2], this mechanism is well suited to produce neutron-rich heavy ions with relatively high cross sections at forward angles of the order of  $\mu$ barns.

An experiment was carried out at Argonne National Laboratory in 2023 using a 136Xe beam on a 238U target with detection of the reaction products at forward angles. The setup consisted of the Gammasphere germanium array to perform prompt  $\gamma$  spectroscopy, the AGFA gas-filled separator (with He gas at 4 Torr) to separate the MNT products. A decay station for decay spectroscopy studies was installed at the focal plane, consisting of a DSSD, a PPAC and silicon detectors in a tunnel configuration surrounded by four Clover germanium detectors.

Few-nucleon transfer channels were successfully identified and their production cross-sections measured. The results of this analysis and their interpretation will be presented in this talk.

Author: BEQUET, Jonathan (CEA/Irfu/DPhN)

**Co-authors:** SULIGNANO, Barbara (CEA Saclay Dphn); Dr STEFAN, Gheorghe (IJCLab); THE #1930 ANL EXPERIMENT COLLABORATION

Presenter: BEQUET, Jonathan (CEA/Irfu/DPhN)

Session Classification: Parallel session

Track Classification: Nuclear Structure, Spectroscopy and Dynamics