



Contribution ID: 117

Type: **Submitted Oral**

The N=126 factory: a new facility to produce the very-heavy neutron-rich isotopes

Thursday 20 September 2018 11:30 (20 minutes)

A new facility, the N=126 factory, is currently under construction at Argonne National Laboratory. It will use multi-nucleon transfer reactions to create neutron-rich isotopes of the heaviest elements for studies of interest to the formation of the last abundance peak in the r-process. This region of the nuclear chart is difficult to access by standard fragmentation or spallation reactions and as a result has remained mostly unexplored. The nuclei of interest, very neutron-rich isotopes around $Z=70-95$, will be produced by multi-nucleon exchange of a high intensity 10 MeV/u heavy-ion beam on the most neutron-rich stable isotopes of heavy elements such as ^{198}Pt and ^{238}U . This reaction mechanism can transfer a large number of neutrons and create with larger than mb cross-section very neutron-rich isotopes. The reaction mechanism is a nuclear surface process and the reaction products come out at around the grazing angle which makes them very difficult to collect. The N=126 factory circumvents this difficulty by using a unique large high-intensity gas catcher, similar to the one currently in operation at CARIBU, to collect the target-like reaction products and turn them into a low-energy beam that will then be mass separated with a medium resolution electromagnetic separator ($DM/M \sim 1/1500$), followed by an RFQ buncher and an MR-TOF ($DM/M \sim 1/100000$) system. The extracted radioactive beams will be essentially pure and be available at low-energy for mass measurements with the CPT mass spectrometer or decay study with the X-array. Status of the overall facility construction will be presented, together with commissioning results of the novel front end and the observed yield.

This work was supported by the U.S. Department of Energy, Office of Nuclear Physics, under Contract No. DE-AC02-06CH11357 and used resources of ANL's ATLAS facility, an Office of Science User Facility.

Author: Prof. SAVARD, Guy (Argonne National Laboratory)

Presenter: Prof. SAVARD, Guy (Argonne National Laboratory)

Session Classification: Session 12 - Ion guide, gas catcher, and beam manipulation techniques

Track Classification: Ion guide, gas catcher, and beam manipulation techniques