Summary: Status of R&D on ion source at IPNO

IPNO achieves various studies and developments on ion sources in the framework of European projects for future facilities and for the operation of ALTO facility. Most of these developments are dedicated to ion sources for the production of radioactive beams. Developments on ion sources for stable beams have also been programmed, in particular for the national ANDROMEDE project. This short status report will focus on the radioactive ion sources developed at the ALTO facility of IPNO.

1. The IRENA ion source

For Spiral2 project, IPNO is developing a plasma ion source called IRENA (Ionization by Radial Electron Neat Adaptation). This prototype has been designed to operate under the high level of radiation generated in the Spiral2 irradiation conditions to produce the neutron-rich radioactive beams. This constraining irradiation conditions being a closer step towards the facility designed for EURISOL, a study has been achieved to integrate the IRENA prototype to EURISOL operation, particularly for the multi-mega-watt target station. First IRENA prototypes have been manufactured and tested at the ALTO off-line isotope separator. The preliminary results were quite promising according to estimations worked out during the design, the total extracted currents being comparable to standard FEBIAD used at ISOLDE CERN and ALTO. Furthermore, the first ionization efficiencies obtained for stable Ar are already higher than a few percents. However, none of these results were obtained in operation conditions. Indeed, due to high voltage issues, the off-line separator could not deliver beams over 20 kV. The identification of the various high voltage issues has leaded us to the decision of designing a new extraction electrode. During the design, IPNO has benefited from ISOLDE CERN collaboration. Indeed, even if the specifications are different: small volume of the vacuum chamber, need for a fast withdrawal of the electrode etc., data supplied by ISOLDE CERN were very helpful. The assembly of the new electrode is planned for the end of autumn 2011.

2. The RILIS in collaboration with ISOLDE-CERN

For the ALTO facility, in collaboration with ISOLDE CERN, IPNO should start soon the operation of a laser ion source. The exploitation of the laser installation will start with the production of neutron-rich Ga beams. The engineer in charge of the lasers at ALTO has been trained at ISOLDE CERN on dye laser techniques, and also has taken part in an experiment.

3. The submitted NUPNET EURIMIS proposal

In the framework of the first NuPNET call, IPNO has submitted a proposal involving 5 European laboratories: CERN, IFJ (Poland), IPNO (France), LNL-INFN (Italy), SLCJ (Poland). The proposal named EURIMIS (EURIsol Multi-megawatt Ion Sources) is a program for the development of ion source prototypes intended for the EURISOL multi-mega-watt target station. It consists in four work packages, for an overall budget of 320 k€.