Contribution ID: **25** Type: **not specified**

Gas Cell Based Laser Ion Source for Production and Study of Neutron Rich Heavy Nuclei

Thursday, 21 February 2013 16:30 (20 minutes)

A new setup for synthesis and study of new heavy nuclei, based on gas cell laser ion source is under construction at FLNR JINR (Dubna). A creation and a launch of this facility will open a new field of research in low-energy heavy-ion physics, and new horizons in the study of unexplored "north-east"area of the nuclear map will become possible.

This unexplored area of heavy neutron rich nuclei is very important for nuclear physics investigations and for the understanding of the r-process in astrophysical nucleosynthesis. Just in this region the closed neutron shell N=126 is located which is the last "waiting point"in the r-process .The half-lives and other characteristics of these nuclei are important for the r-process scenario of supernovae explosions. Study of the properties of nuclei along the neutron shell N = 126 could also contribute to the present discussion of the quenching of shell gaps in nuclei with large neutron excess.

During the last several years a combined method of separation based on stopping nuclei in gas and subsequent resonance laser ionization of them has been intensively studied and developed. This method was used up to now for separation and study of light exotic nuclei and fission fragments. Now it is proposed for production of heavy neutron rich nuclei by low-energy multi-nucleon transfer reactions. Such techniques allows one to extract nuclei with a given atomic number, while a separation of the single ionized isotopes over their masses can be done rather easily by a magnetic field. Half-lives of heavy neutron rich nuclei, which we are interested in (as a rule, β-–decaying), are much longer than the extraction time of ions at such a setup.

Primary author: Dr ZEMLYANOY, Sergey (Joint Inst. for Nuclear Research (RU))

Co-authors: Dr KOZULIN, Eduard (Joint Inst. for Nuclear Research (RU)); Dr KOUDRIAVTSEV, Iouri (K); Dr FEDOSSEEV, Valentine (CERN); Prof. ZAGREBAEV, Valery (JINR)

Presenter: Dr ZEMLYANOY, Sergey (Joint Inst. for Nuclear Research (RU))