

GALS – setup for production and study of heavy neutron rich nuclei

Thursday, 5 December 2013 15:15 (20 minutes)

Unexplored area of heavy neutron rich nuclei is very important for nuclear physics investigations and, in particular, for the understanding of astrophysical nucleosynthesis. In this region is the closed neutron shell $N=126$ located which is the last “waiting point” in the r-process. The half-lives and other characteristics of these nuclei are extremely important for this process and scenario of supernovae explosions. Study of the structural 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 has been intensively studied and developed based on stopping nuclei in gas and subsequent resonance laser ionization of them. This method was used up to now for separation and study of light exotic nuclei and fission fragments. 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.

A new setup, based on these principles and devoted to synthesis and study of new heavy nuclei formed in low energy multi-nucleon transfer reactions is under stage of realization at Flerov lab. JINR. 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.

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Session Classification: Nuclear Physics: Parallel Session II