

## GALS – new setup for transfer reaction products on-line separation by selective laser ionization

A new setup called GALS (GAs cell based Laser ionization Setup) is under construction in Flerov Laboratory for Nuclear Reactions (FLNR) in JINR, Dubna. GALS project is devoted to production and study of neutron rich nuclei in the region of the magic neutron number  $N = 126$ . The study of heavy neutron-rich nuclides is very important for the understanding astrophysical nucleosynthesis and r-process. In addition, study of the nuclear structure of extremely neutron rich nuclei is important for the basic nuclear spectroscopy. Using GALS technique could also be helpful for finding new ways for heavy and superheavy nuclei production (see also [http://fls2.jinr.ru/flnr/GaLs/phys\\_bg.html](http://fls2.jinr.ru/flnr/GaLs/phys_bg.html)).



The view of the whole GALS facility. The setup located in experimental room within the FLNR U 400M cyclotron hall, laser laboratory and control room are shown.

In the GALS setup, the available U-400M cyclotron beams will be used in low energy (4.5 to 9 MeV per nucleon) multi-nucleon transfer reactions, such as  $^{136}\text{Xe}$  beam on a thin  $^{208}\text{Pb}$  target. Recoiling into gas cell products are thermalized and neutralized in collisions with the buffer gas (pure Ar) atoms and selectively ionized by two or three laser beams. The resulting single-charged ions carried out from the gas cell by the buffer gas into vacuum through the supersonic nozzle and are being captured by a radio frequency ion guide system, which carries them through differential pumping volumes towards acceleration electrode. Finally, accelerated and mass-separated by analysing magnet ions enter the detecting system for measurement of new heavy neutron-rich nuclei characteristics.

Our nearest tasks will be:

- installation and testing of base production and separation part of the setup
- new lasers installation and testing, developing an unified GUI for controlling all the laser equipment
- modernization and development of the off-line setup for laser spectroscopy, performing the experiments on extended investigation of ionization schemes of elements of interest
- computer modelling and development of the ion guide system using SIMION software
- computer modelling and development of the radiation protection from the primary beam using FLUKA software

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