

## Low background HPGe spectrometer in investigations of $2\beta$ decay

*Thursday, 11 April 2013 15:00 (1h 20m)*

To search for double beta decay processes to the excited states of daughter nuclei, such as resonant  $0\nu\text{EC}/\text{EC}$  decay of  $^{106}\text{Cd}$  (TGV experiment) and  $2\nu 2\beta^-$  decay of  $^{100}\text{Mo}$  (NEMO-3 experiment) to the  $0^+$  (1130 keV) and  $2^+$  (540 keV) excited states of  $^{100}\text{Ru}$ , a low background HPGe spectrometer Obelix with sensitive volume of 600 cm<sup>3</sup> and efficiency of ~160% was installed at the Modane Underground Laboratory (LSM, France, 4800 m w.e.), as a common activity of JINR-IEAP CTU-LSM (details of the spectrometer will be presented by P.Loaiza). Such types of investigations are based on analyzing of  $\gamma$ -rays emitting in de-excitation of the excited states of daughter nuclei. The sensitivity of the Obelix spectrometer for  $2\beta$  measurements is higher than  $T_{1/2} \sim 10^{21}$  years. To obtain the detector efficiency for such measurements the original method of using special low-active samples with known mass and activity was developed. The samples were produced from the powder of  $\text{La}_2\text{O}_3$ . The natural La in this powder consists of ~0.09% of  $^{138}\text{La}$  ( $T_{1/2} = 1.02 \times 10^{11}$  years), which is characterized by emission of  $\gamma$ -rays with energies of 788.7 keV and 1435.8 keV. Based on the results of measurements of  $\text{La}_2\text{O}_3$  and standard sources of  $^{152}\text{Eu}$  and  $^{133}\text{Ba}$ , efficiency curves for the measurements of double beta emitters were obtained. Metallic foil of enriched  $^{100}\text{Mo}$  with a mass of 2517 g was measured with the Obelix spectrometer for 2288 hours. From this measurement the contamination of  $^{100}\text{Mo}$  foil (radioactive isotopes and their activities) as well as half-life of  $2\nu 2\beta^-$  decay of  $^{100}\text{Mo}$  to the  $0^+$  and  $2^+$  excited states of  $^{100}\text{Ru}$  were obtained. The preliminary results will be presented.

**Primary author:** Ms RUKHADZE, Ekaterina (Institute of Experimental and Applied Physics CTU, Prague)

**Presenter:** Ms RUKHADZE, Ekaterina (Institute of Experimental and Applied Physics CTU, Prague)

**Session Classification:** Poster session

**Track Classification:** Screening facilities and low background detectors