

Measurements of γ -radioactivity level of the LSM

Activity in LSM: 2013-2014.

We used HPGe detector EGSP 2500-R without shield for measurements of γ -spectra of natural radioactivity in different places in LSM. The starting motivation for these measurements was in determination of influence of LSM anti-radon factory on total radioactive background of the laboratory. The influence was expected due to accumulation of radon daughters inside of anti-radon factory towers. We started measurements in end of May 2013 in time when anti-radon factory been stopped for more than 40 days (more than 10 periods of decay of Rn-222). We continue in September 2013 when anti-radon factory been continuously working for more than 40 days. For comparison of spectra measured in proximity to the factory we performed reference measurement in LSM control room. The experimental spectra are presented in figs. 25-29.



Fig. 24: Some places of measurements with HPGe detector in proximity to the anti-radon factory.

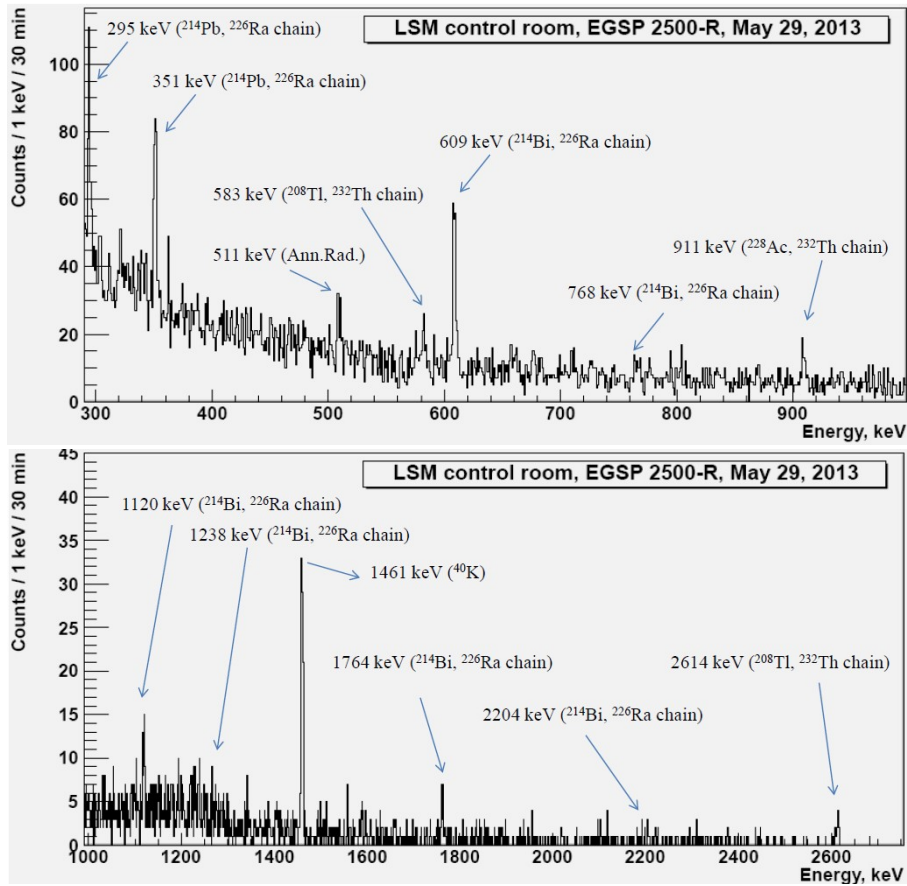


Fig. 25: Measured γ -spectra in the LSM control room (May 2013).

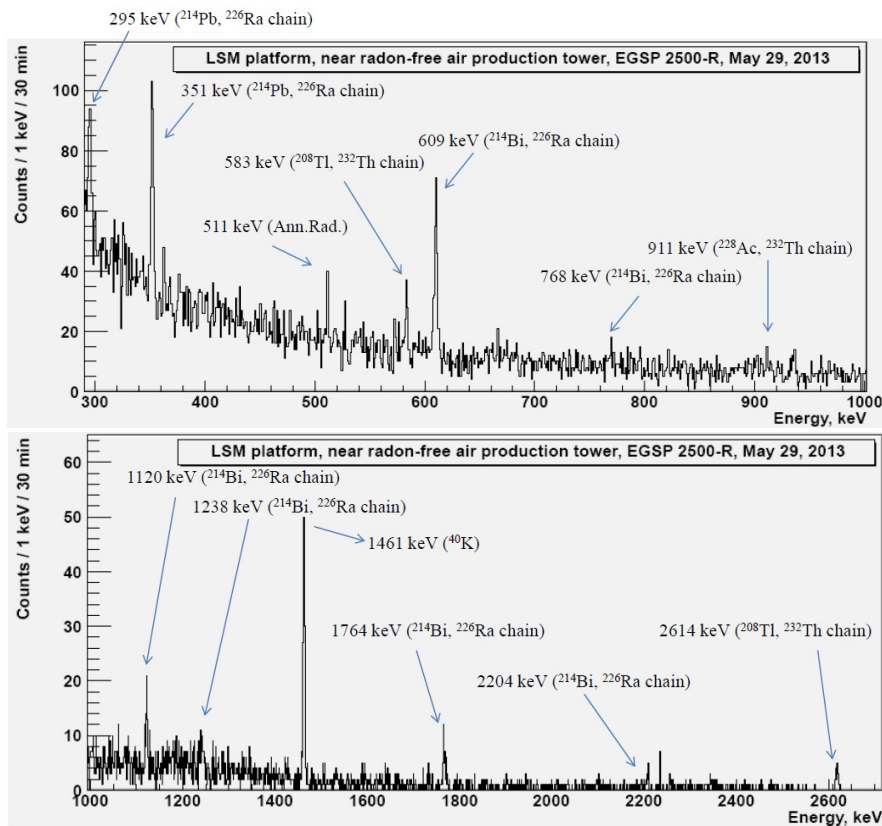


Fig. 26: Measured γ -spectra in the proximity to the anti-radon factory. Place of the measurement: between two towers, about 1.5 m from the ground (fig. 24 top, left). Measurements performed in end of May 2013, when anti-radon factory been stopped for more than 40 days.

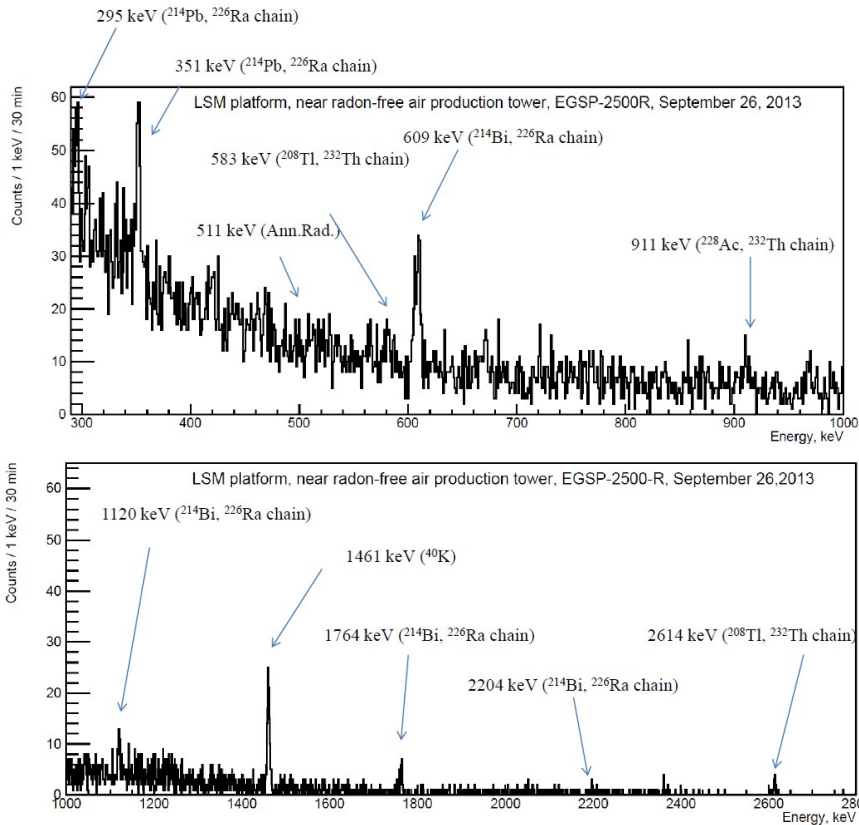


Fig. 27: Measured γ -spectra in the proximity to the anti-radon factory. The same place of measurement as for fig. 26, but the anti-radon factory is working more than 40 days.

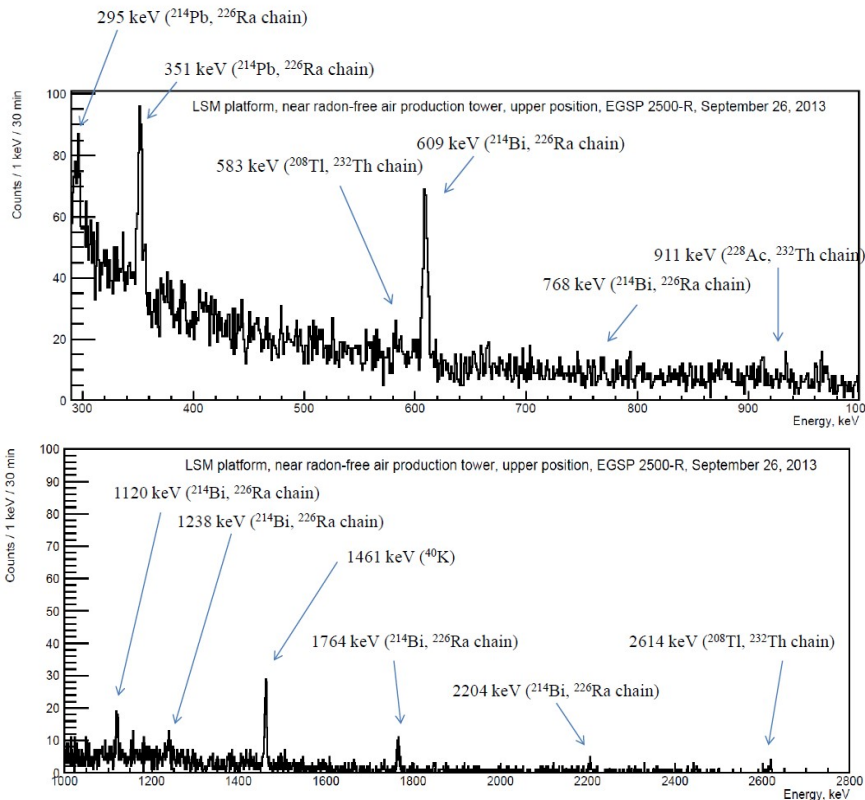


Fig. 28: Measured γ -spectra in the proximity to the anti-radon factory. Place of the measurement: between two towers, on the top (fig. 24 top, right). Measurements performed when the anti-radon factory is working more than 40 days.

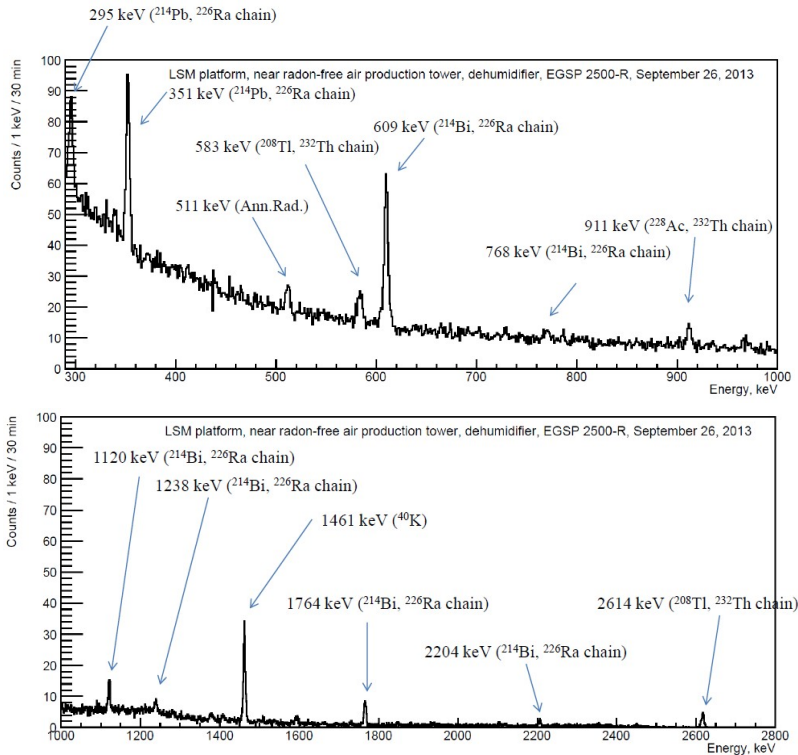


Fig. 29: Measured with ZZ-top γ -spectra in the proximity to the anti-radon factory. Place of the measurement: near air dehumidifier on the platform (fig. 24 bottom). Measurements performed when the anti-radon factory is working more than 40 days.

The result of all above study is that anti-radon factory does NOT produce any significant γ - background on a distance from 1 m from it surface.

In 2014 the same HPGe detector has been used for long term measurements of γ -activity in LSM. For this the detector has been set in the LSM control room. Measurements were performed in runs with time of each run equal to 1h. Runs started on April 14th and continued till August 12th 2014. As example of received results fig. 30 shows measured intensity of 351 keV γ -line in different days. This is γ -line of Pb-214 decay (Rn-222 decay chain). Measured intensity of the line was found to be stable with time. We observed no dramatic changes with time of other γ -lines intensities.

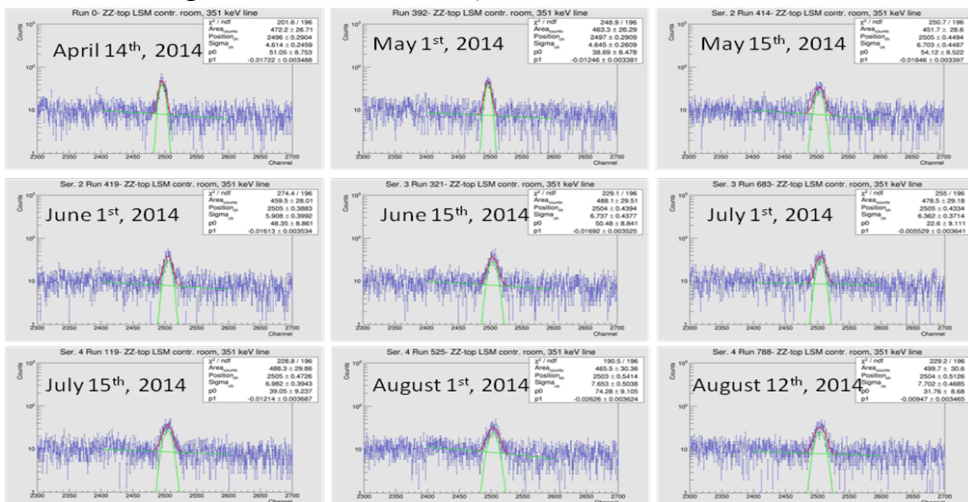


Fig. 30: Measured intensity of 351 keV (Pb-214) γ -line in different days of 2014 y. Run time for each spectrum is 1 h.