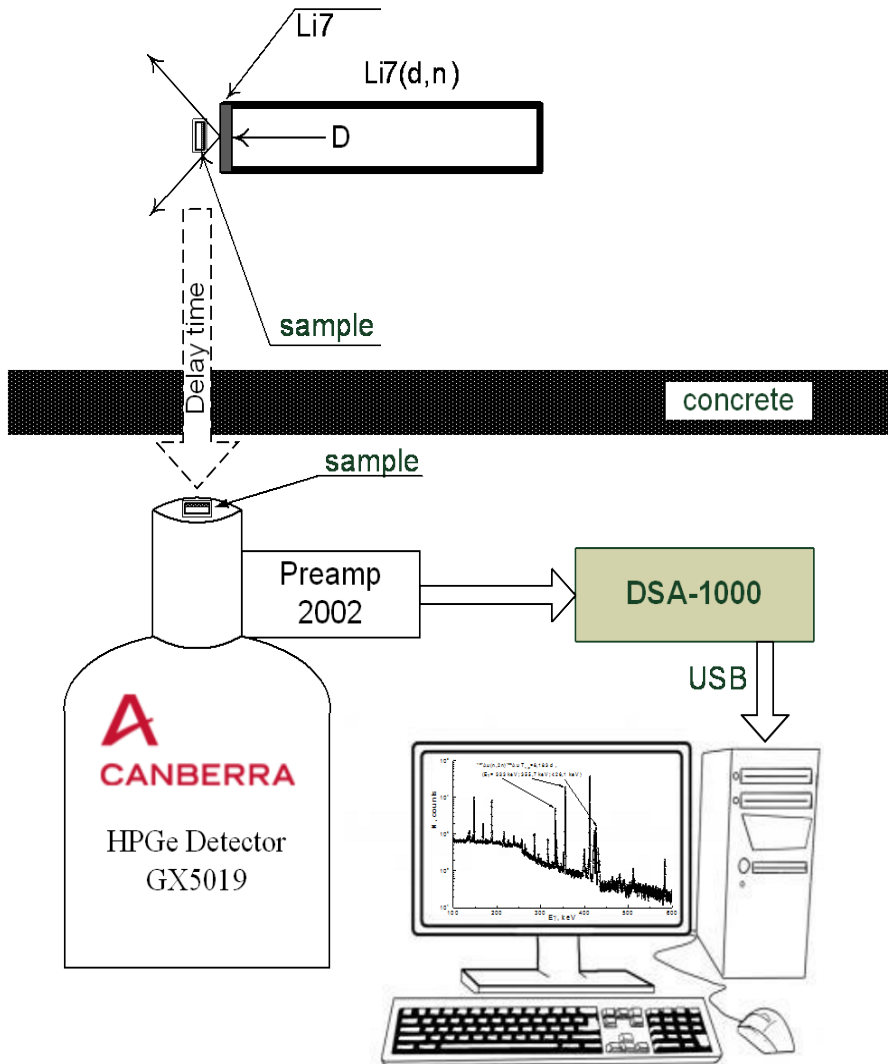


# The energy spectrum of neutrons from ${}^7\text{Li}(\text{d},\text{n}){}^8\text{Be}$ reaction at deuteron energy 2.9 MeV

*Mitrofanov K.V., Piksaikin V.M., Zolotarev K.I.,  
Egorov A.S., Gremyachkin D.E.*

JSC “SSC RF – IPPE”  
249033, Obninsk, Russia

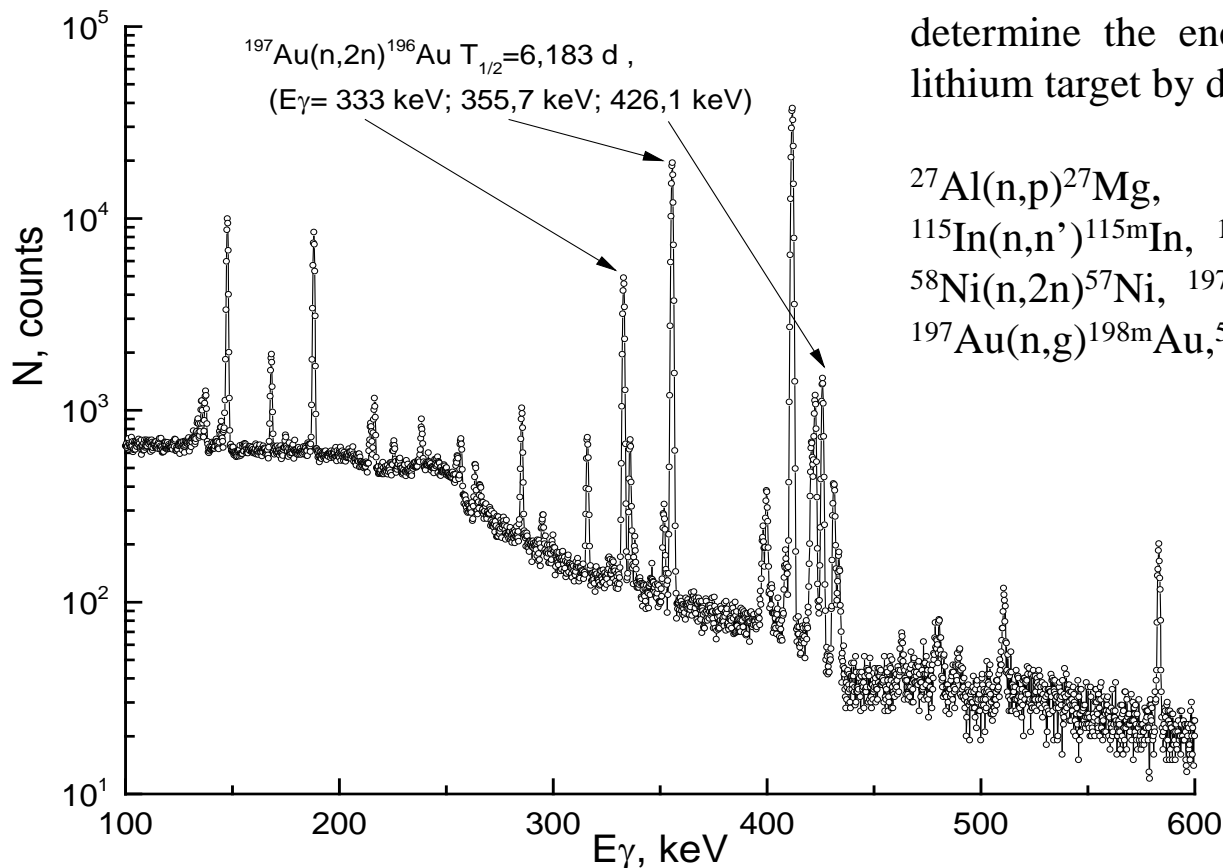
# Scheme of the experimental setup



The irradiation of the activation monitors by neutrons from the reaction of  $\text{Li(d,n)}$  was carried out **at  $0^\circ$  to the axis of the beam** in Tandatron accelerator of IPPE.

All activation detectors (monitors) used for measuring the rates of these reactions were produced in the form of discs with a diameter of 10 to 12.2 mm. Geometrical thickness of monitors was in the range of 0.6 to 3.5 mm. All monitors used for measuring the rate of threshold reactions were made of **chemically pure metal** of the corresponding elements.

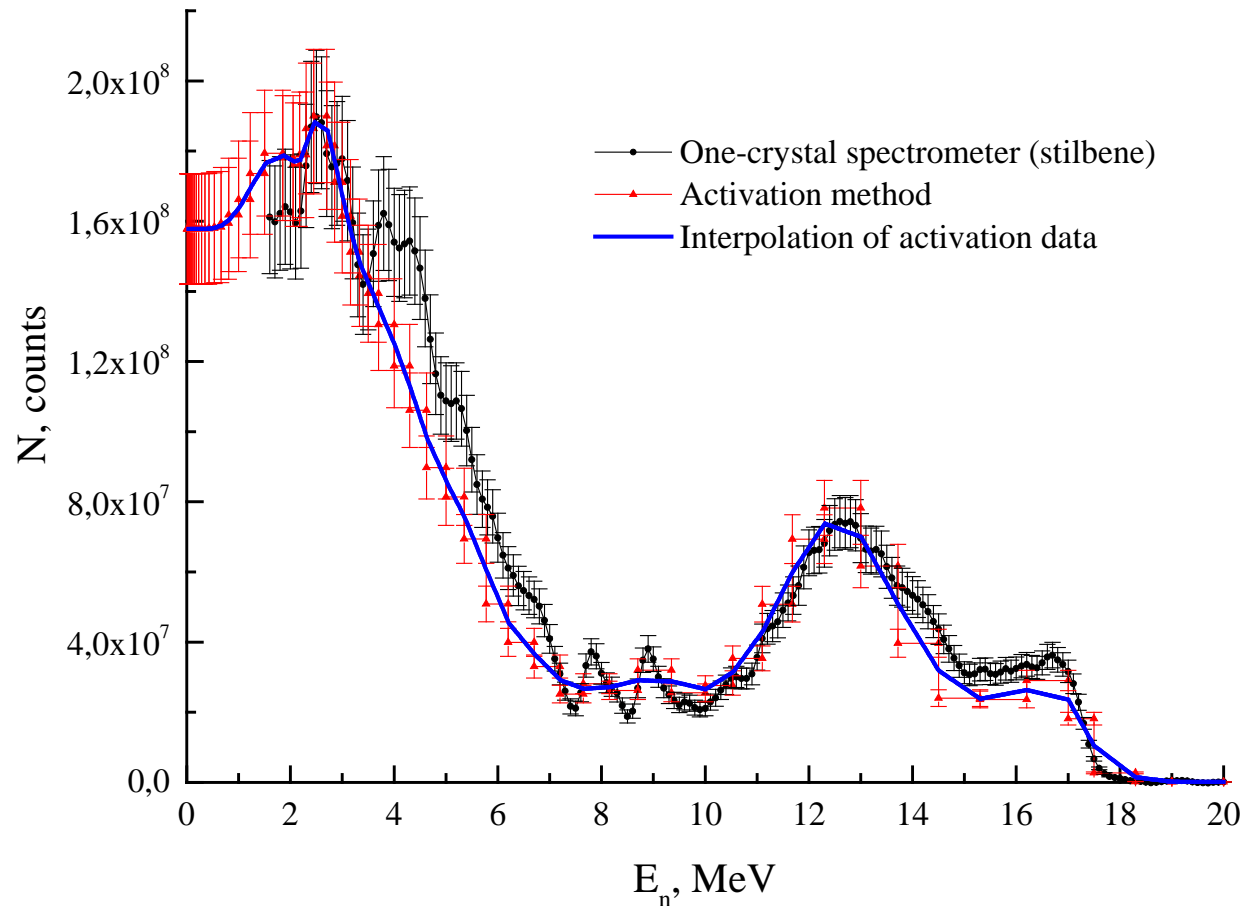
# Apparatus spectrum of gamma rays from $^{197}\text{Au}(n,2n)^{196}\text{Au}$ reactions after irradiation by the neutron flux



The rate values of the following nuclear reactions were measured by activation method to determine the energy spectrum generated in the lithium target by deuterons with 2.9 MeV:

$^{27}\text{Al}(n,p)^{27}\text{Mg}$ ,  $^{27}\text{Al}(n,\alpha)^{24}\text{Na}$ ,  $^{113}\text{In}(n,n')^{113\text{m}}\text{In}$ ,  
 $^{115}\text{In}(n,n')^{115\text{m}}\text{In}$ ,  $^{115}\text{In}(n,g)^{116\text{m}}\text{In}$ ,  $^{58}\text{Ni}(n,p)^{58\text{m}}\text{Co}$ ,  
 $^{58}\text{Ni}(n,2n)^{57}\text{Ni}$ ,  $^{197}\text{Au}(n,g)^{198}\text{Au}$ ,  $^{197}\text{Au}(n,2n)^{196}\text{Au}$ ,  
 $^{197}\text{Au}(n,g)^{198\text{m}}\text{Au}$ ,  $^{59}\text{Co}(n,p)^{59}\text{Fe}$ ,  $^{59}\text{Co}(n,2n)^{58\text{m}+g}\text{Co}$ .

## Results



- ✓ The spectrum of the neutrons from the  ${}^7\text{Li}(\text{d},\text{n}){}^8\text{Be}$  reaction at an angle of  $0^\circ$  to the beam axis was measured by activation method that uses a link between induced activity of detectors and flux of neutrons.
- ✓ It is worth noting that  ${}^7\text{Li}(\text{d},\text{n}){}^8\text{Be}$  reaction was measured by **activation method for the first time ever**.
- ✓ Figure shows **a good agreement** in the range from 7 to 18 MeV between the activation spectrum with the spectrum obtained by using single-crystal spectrometer based on stilbene crystal.
- ✓ At the present time the studies on the possible reasons for the some discrepancy of neutron spectra obtained by activation method and the scintillation spectrometer in the range from 3 to 7 MeV **are carrying out**.