Monte Carlo simulation of Neutrino-4 experiment

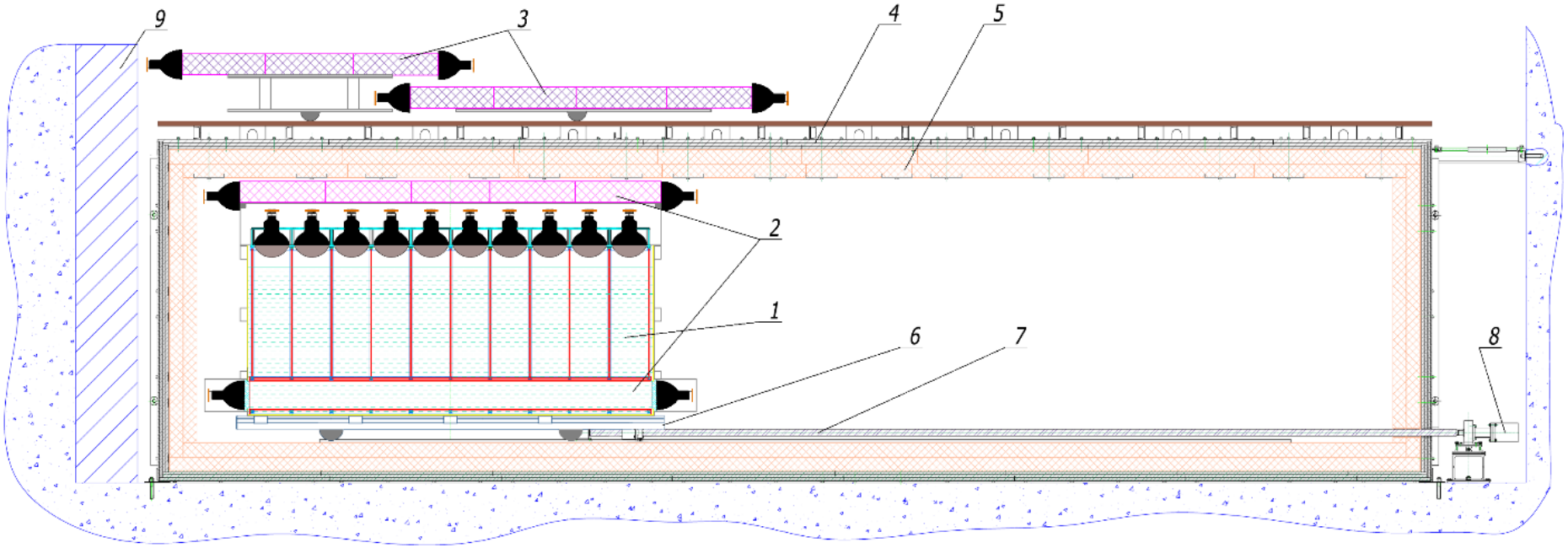
A. Fomin

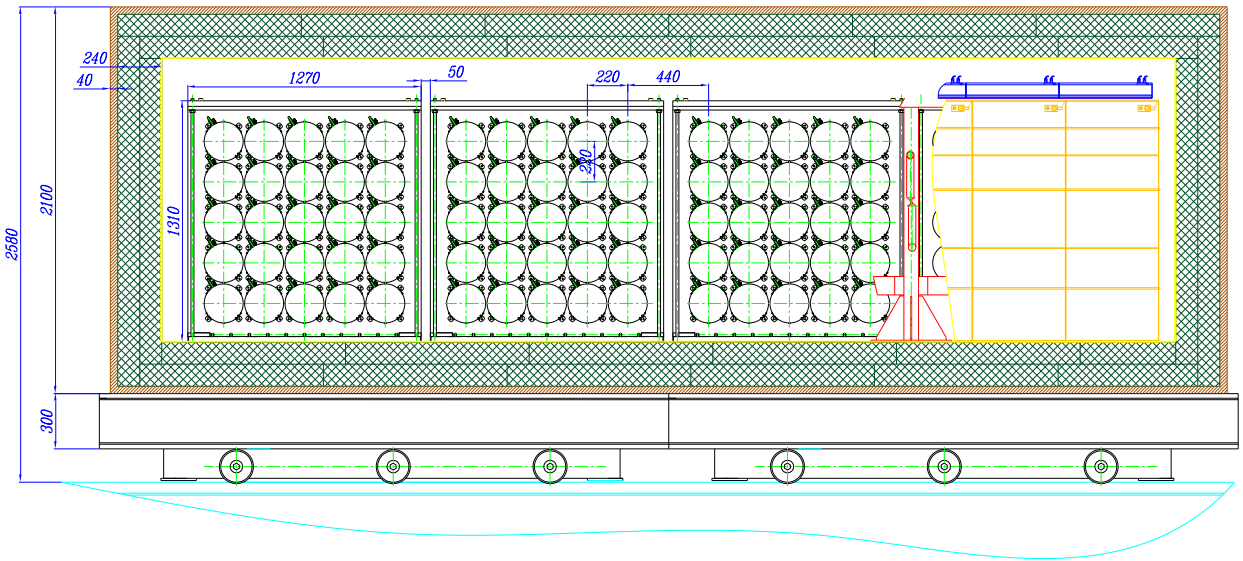
Project leader: A. Serebrov

NRC «Kurchatov Institute» - PNPI, Russia, Gatchina

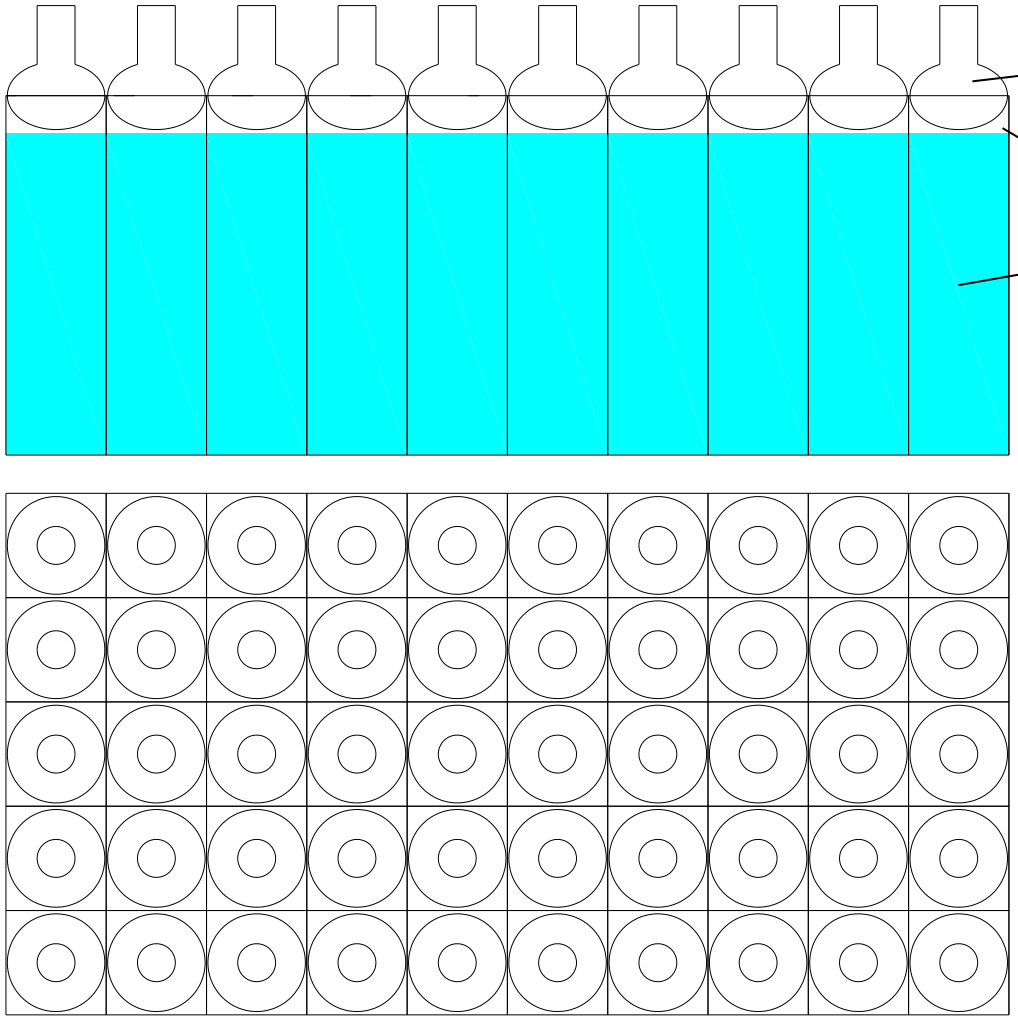
20th Lomonosov Conference on Elementary Particle Physics
Moscow State University, 19-25 August 2021

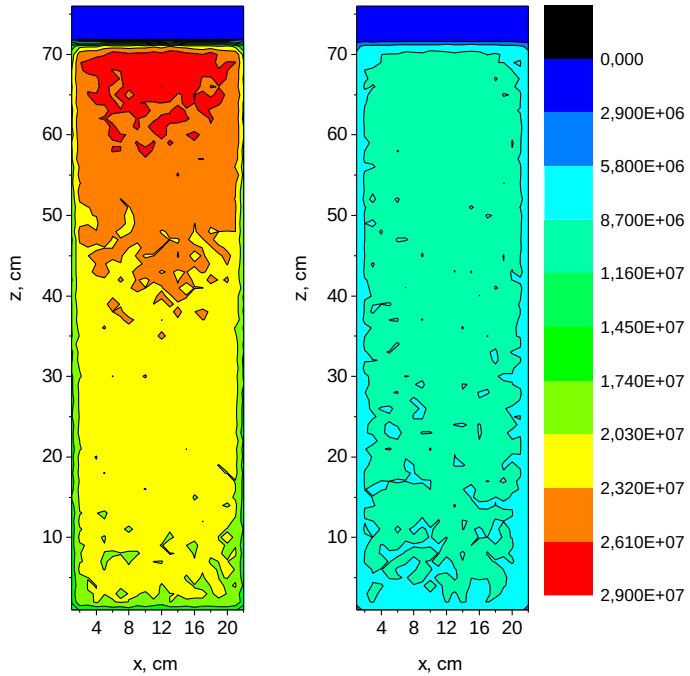
Current and new detectors



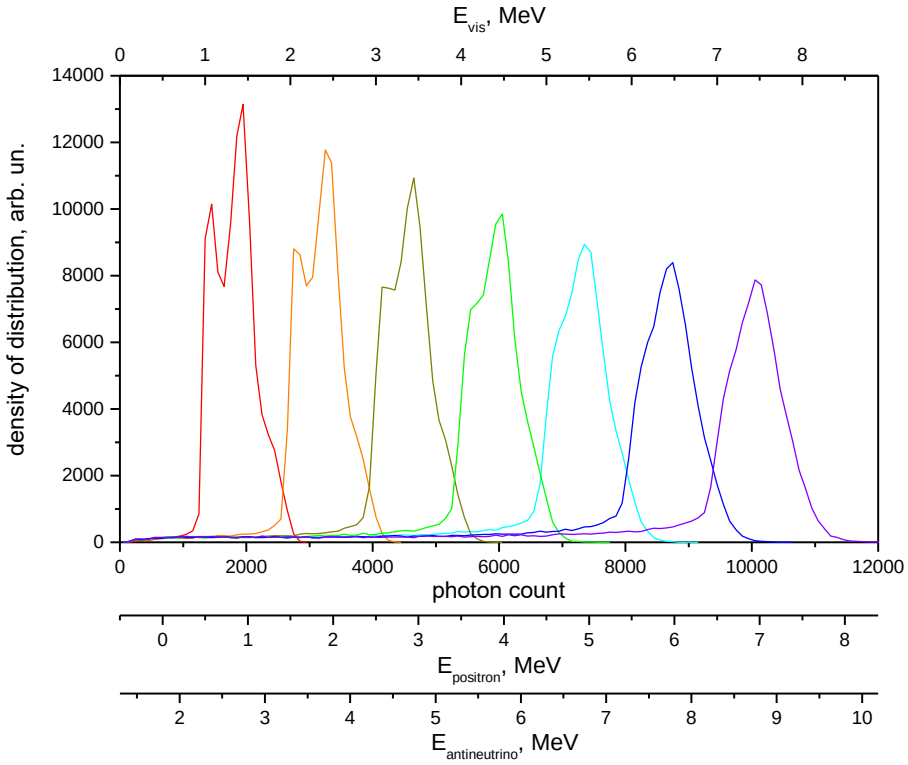


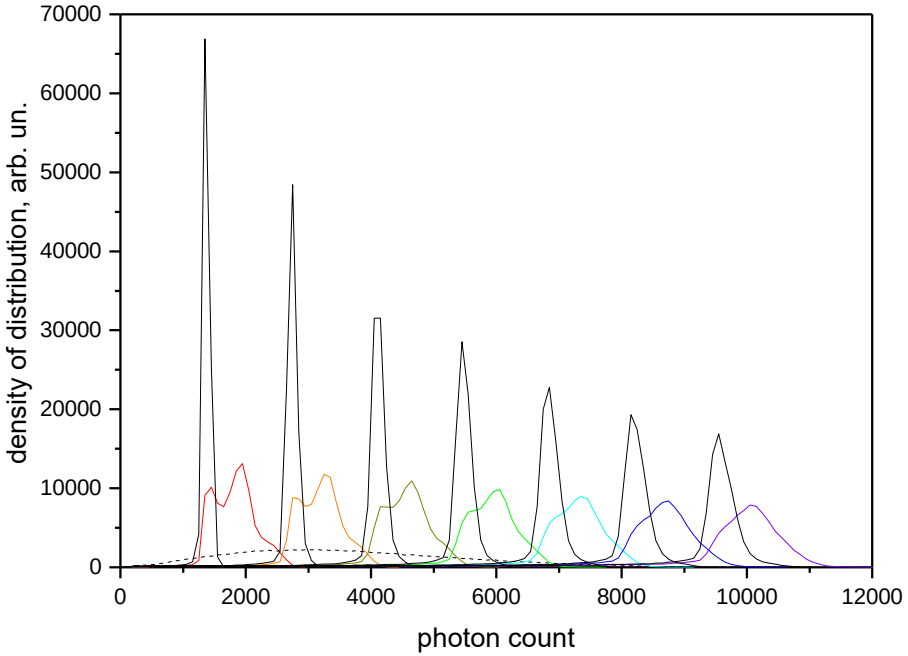
Calculational scheme

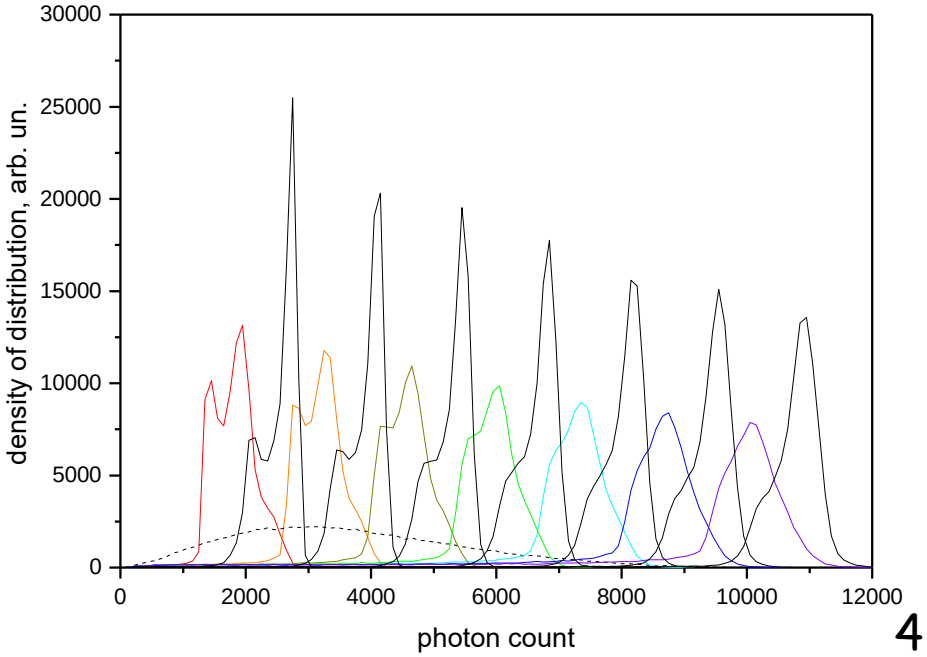




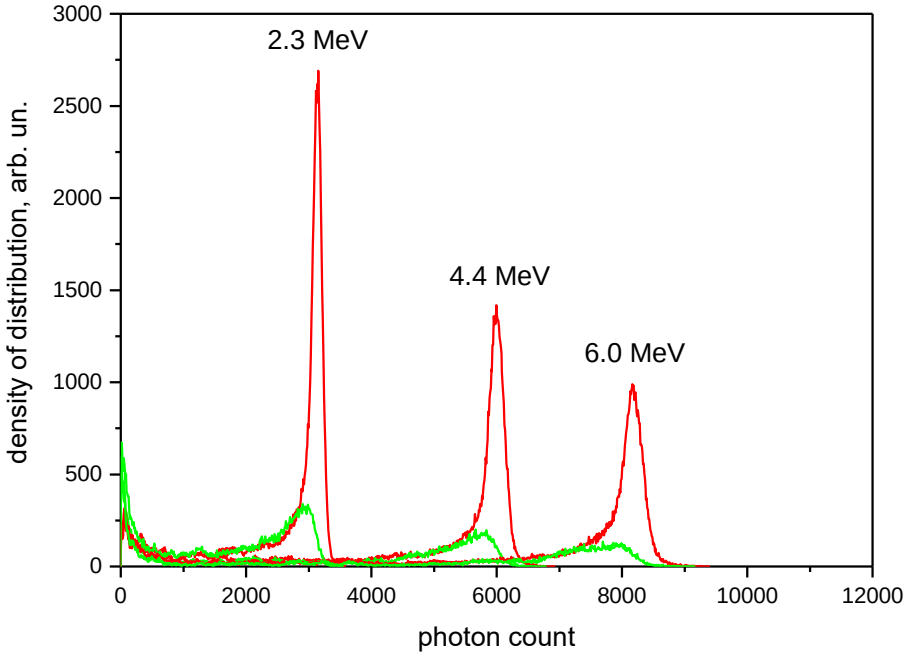
Distribution of counts of PMT in one section



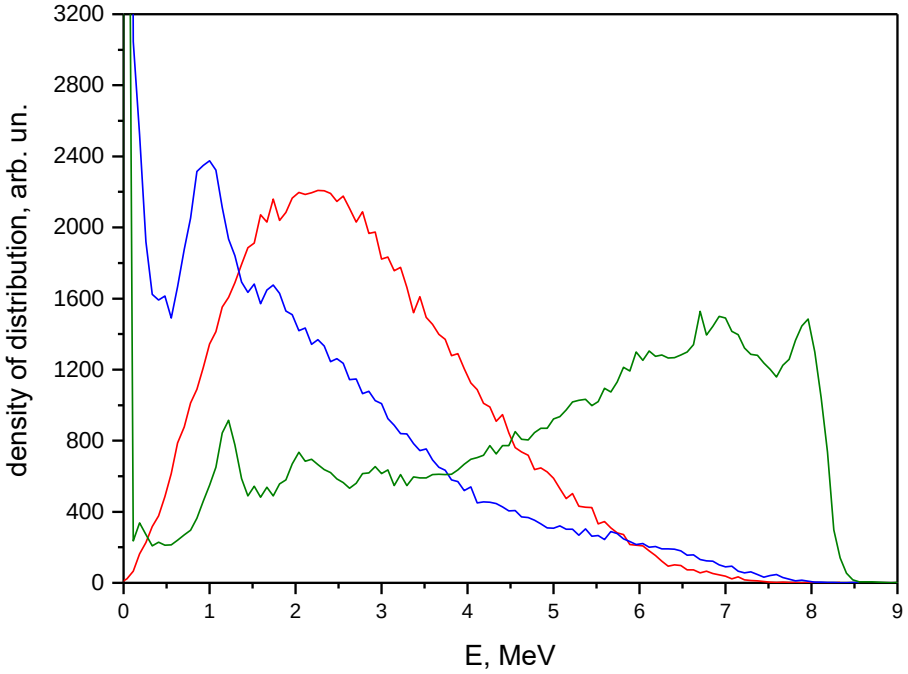




Signals in detector

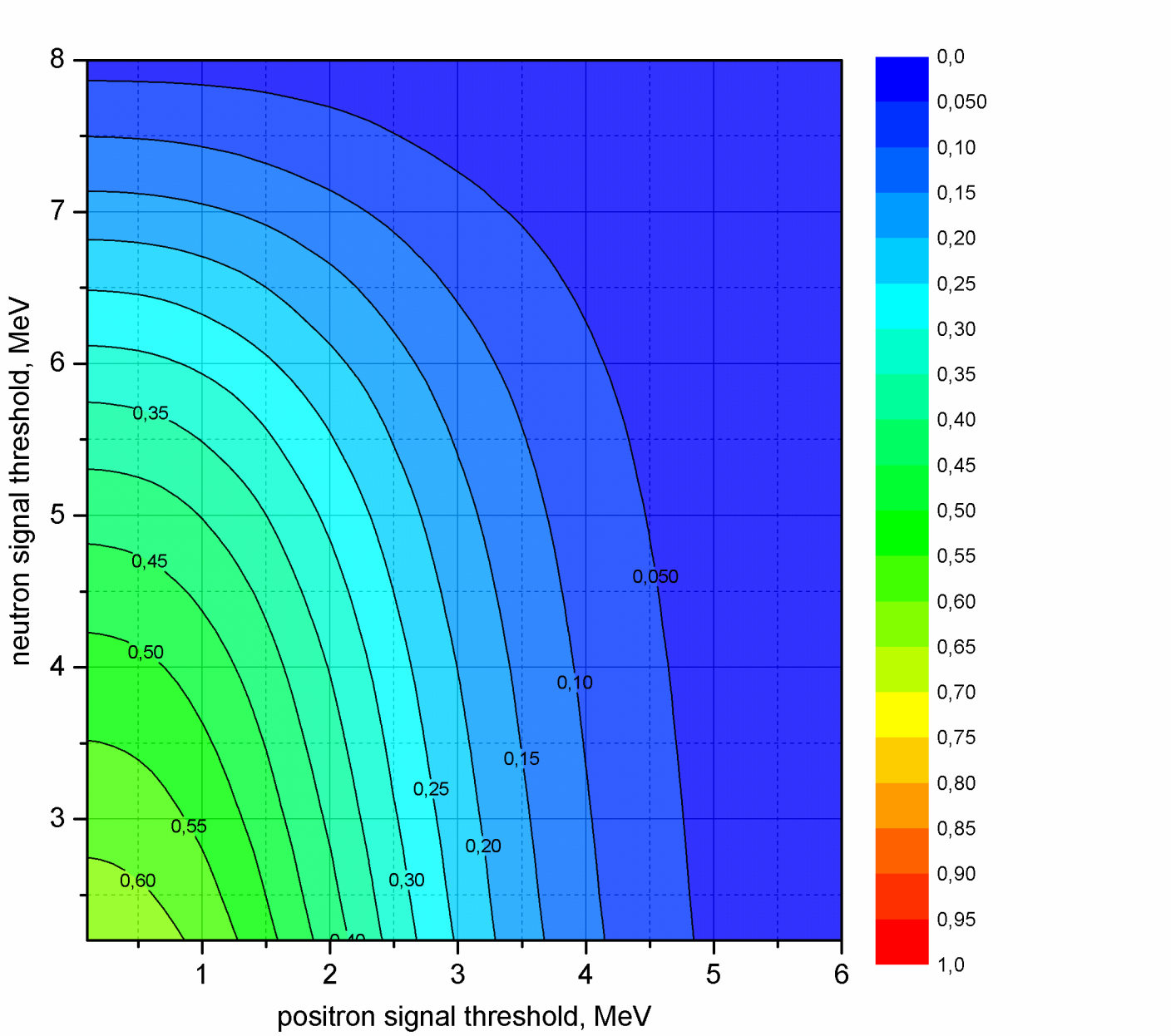


gamma quanta

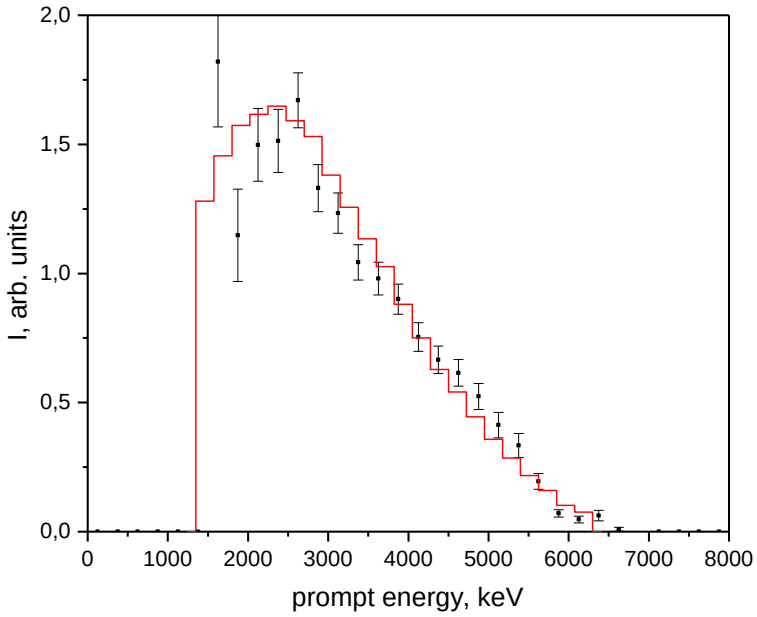


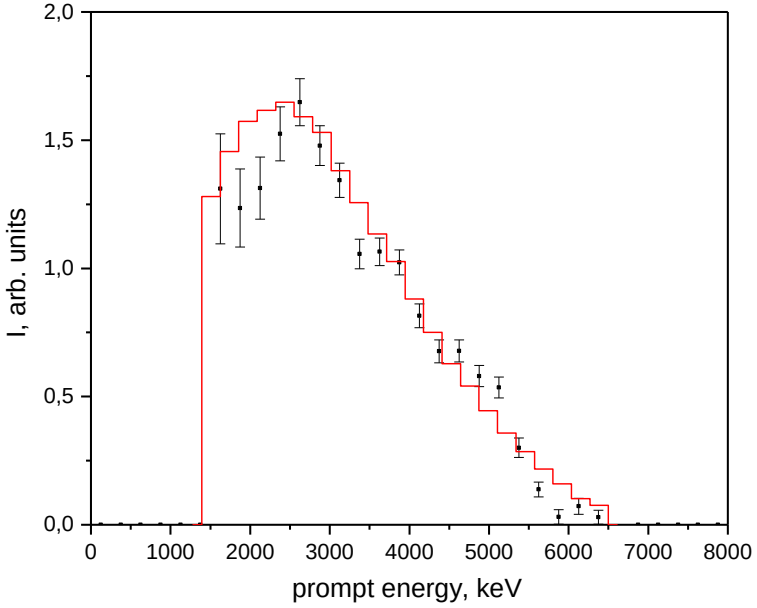
positron and neutron events

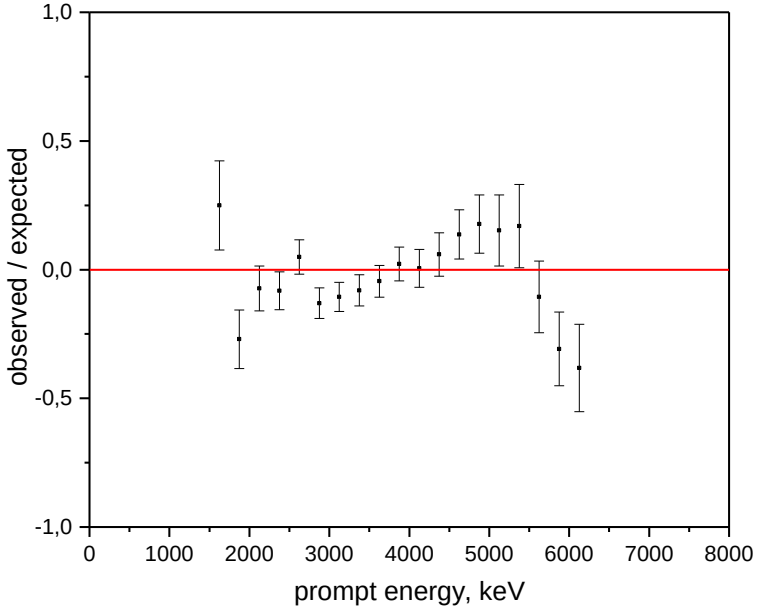
Efficiency of the detector

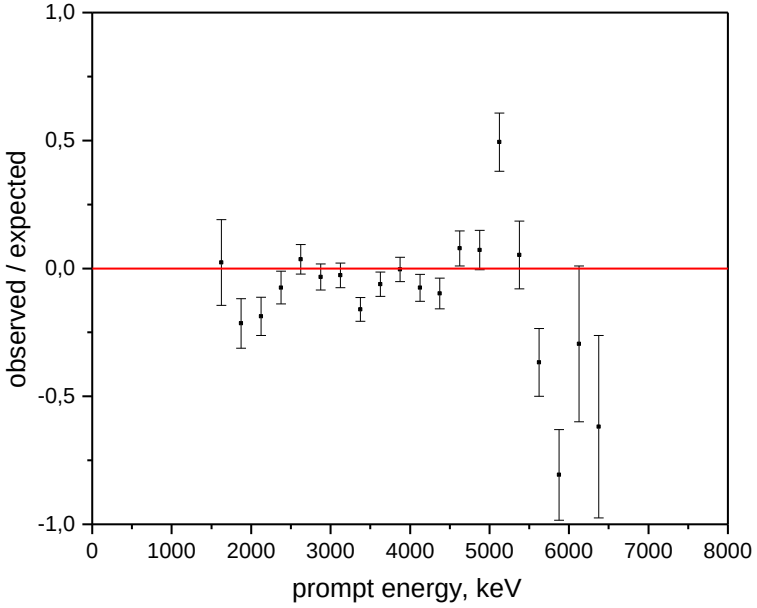


Comparison of MC and experimental spectrum

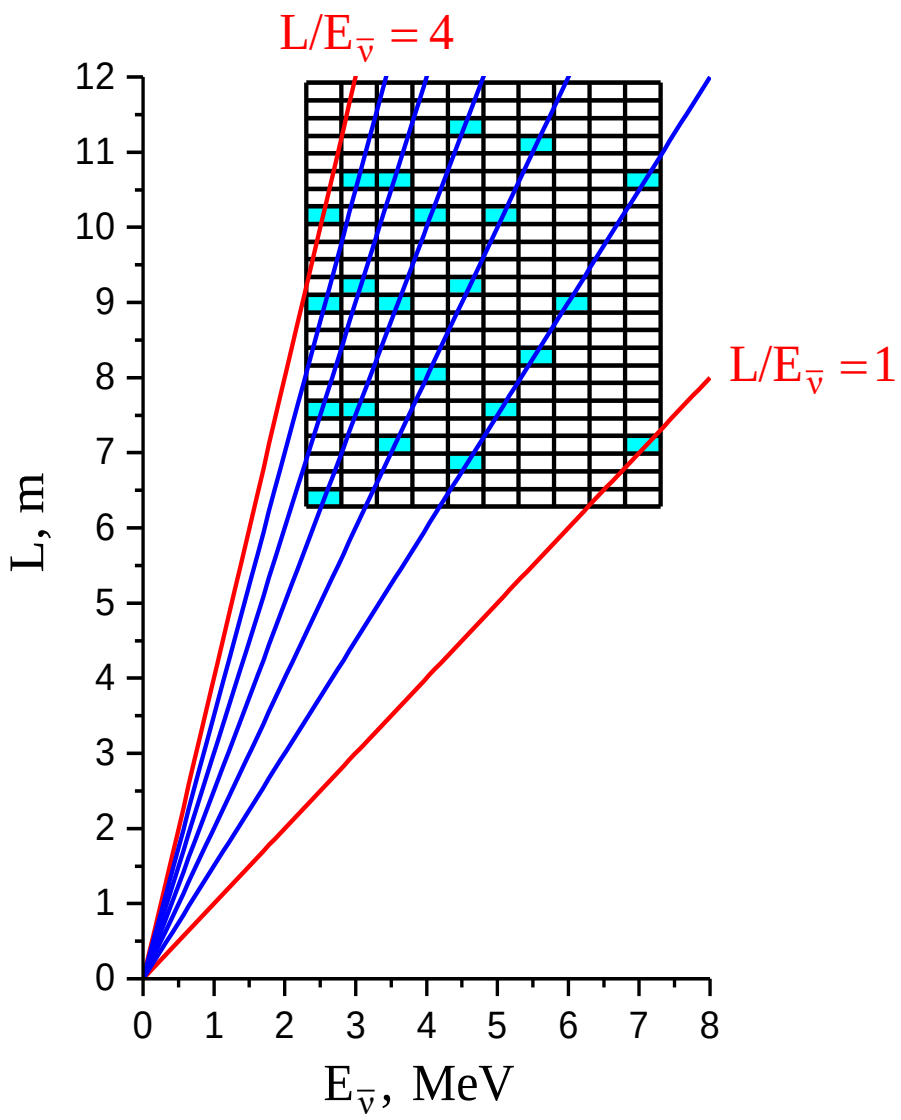


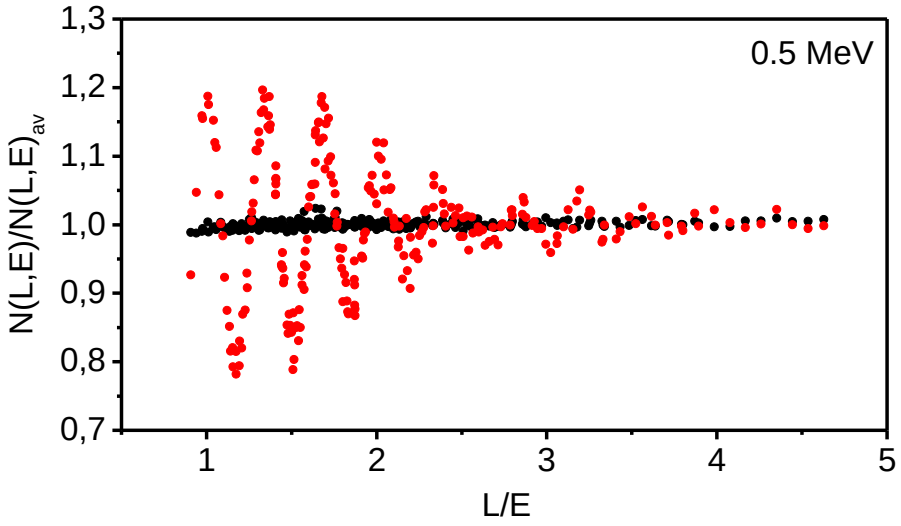


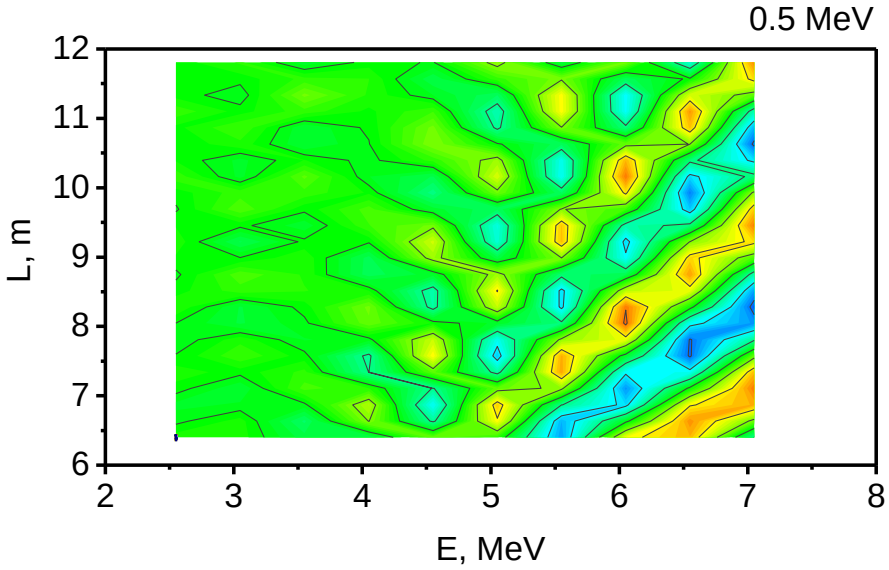




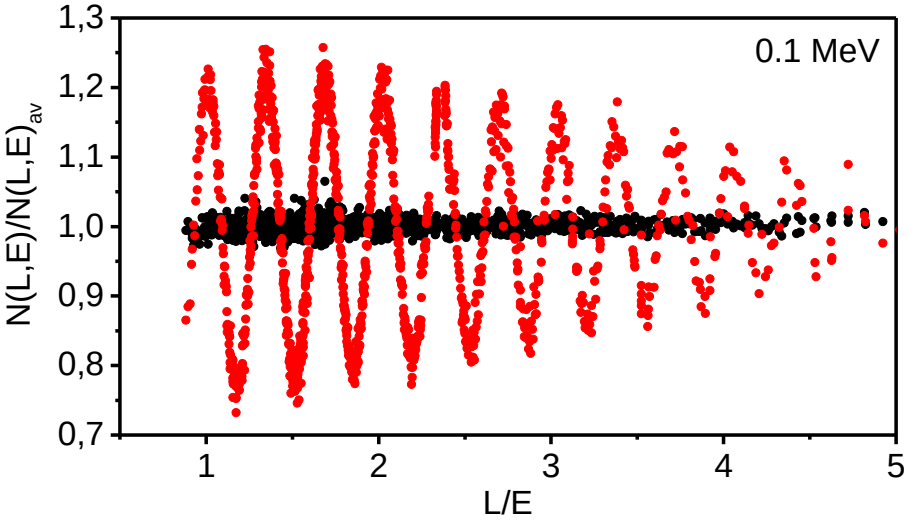
Method of coherent summation

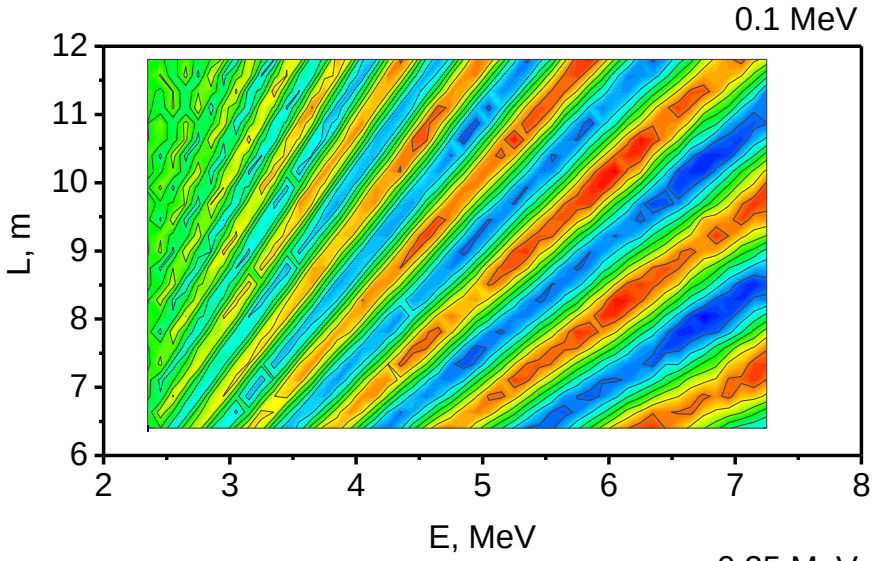


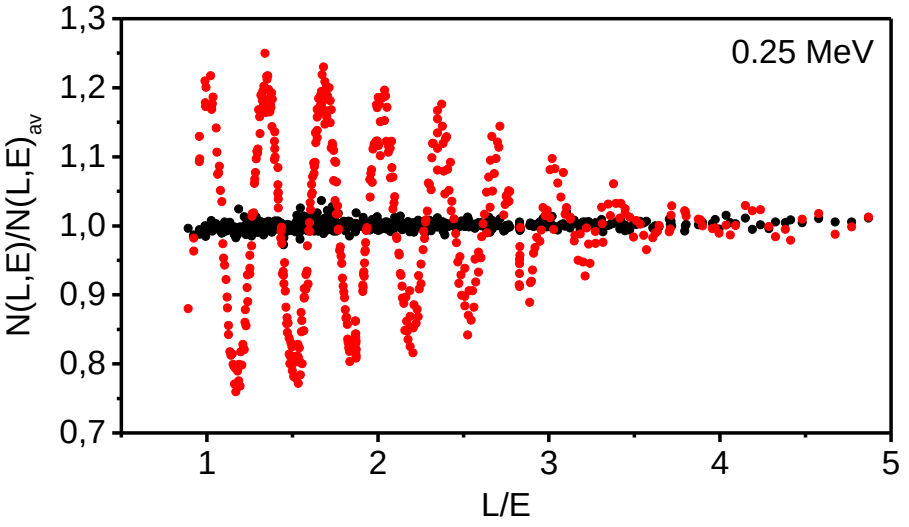


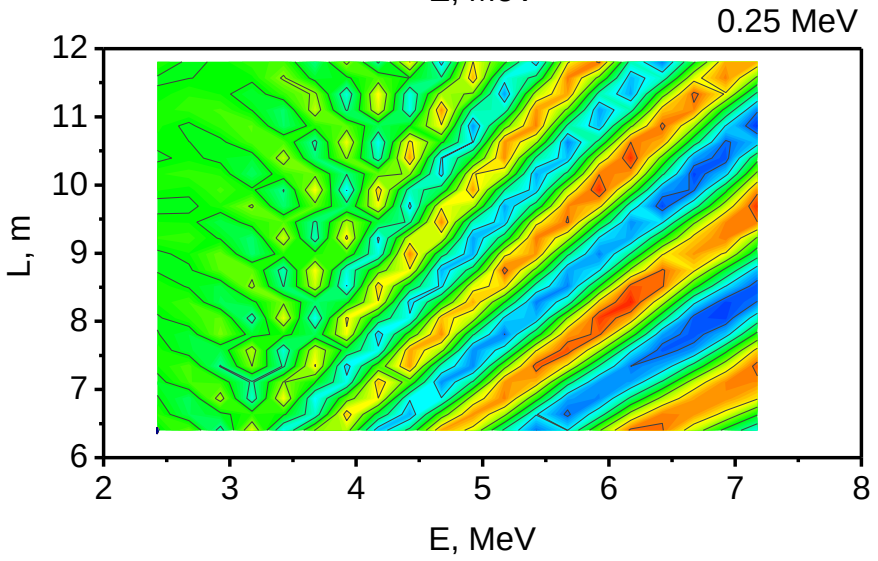


The expected effect for the different energy resolution from MC calculation

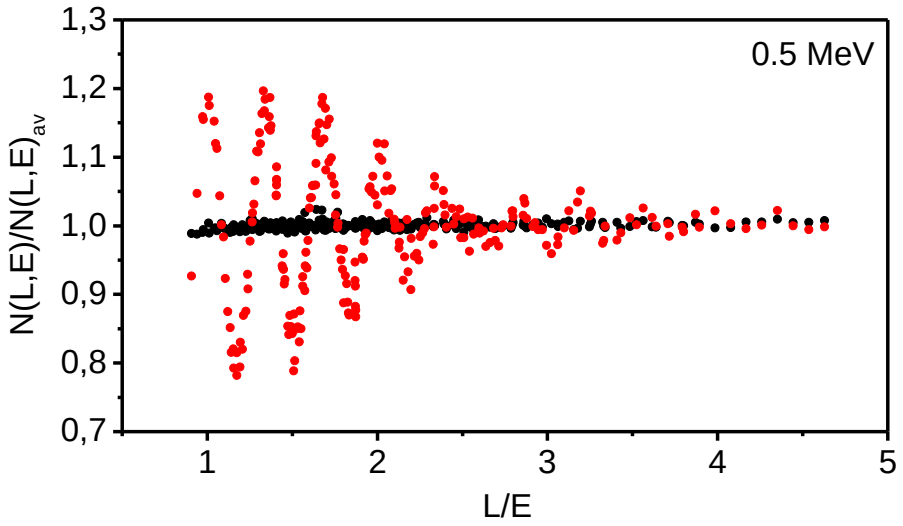


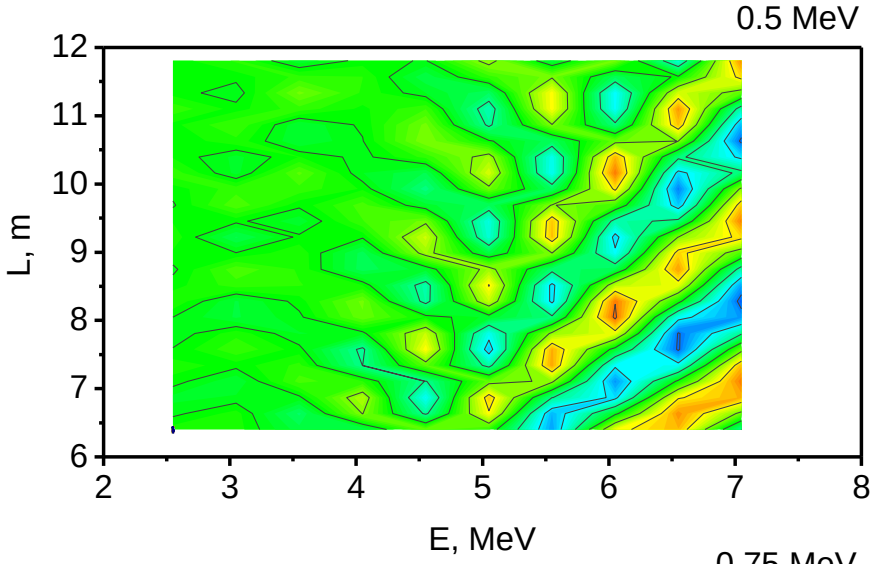


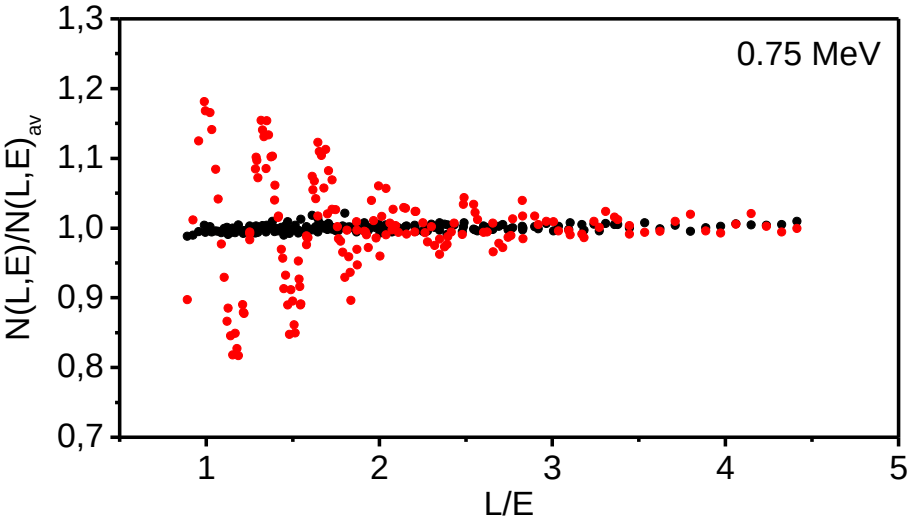


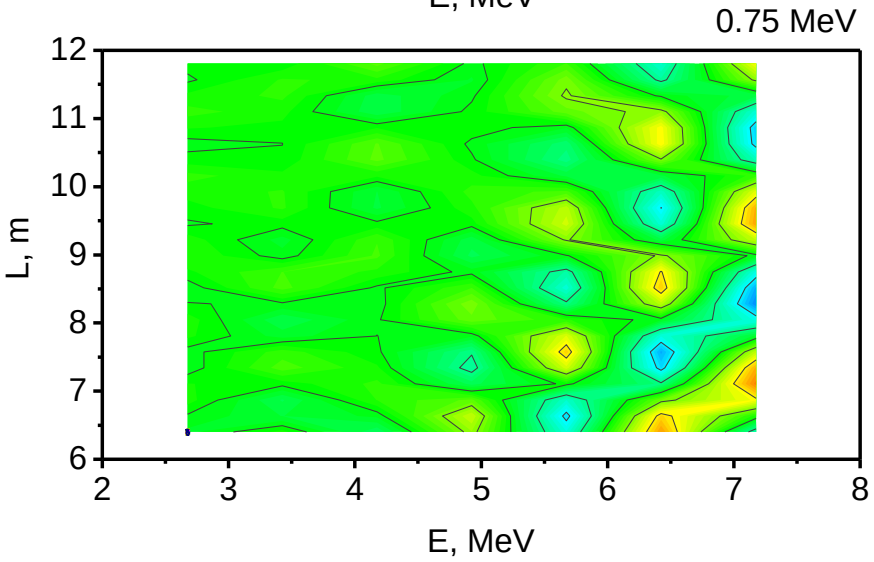


The expected effect for the different energy resolution from MC calculation

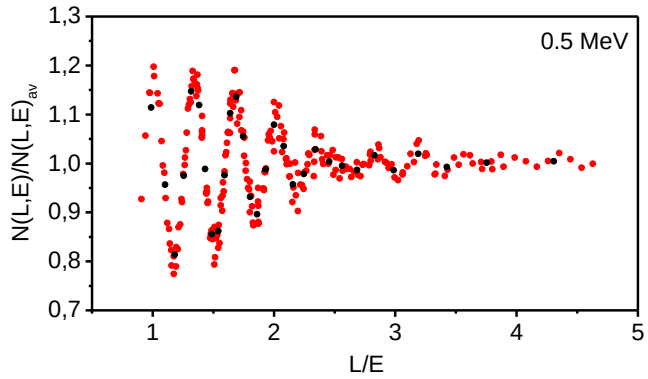


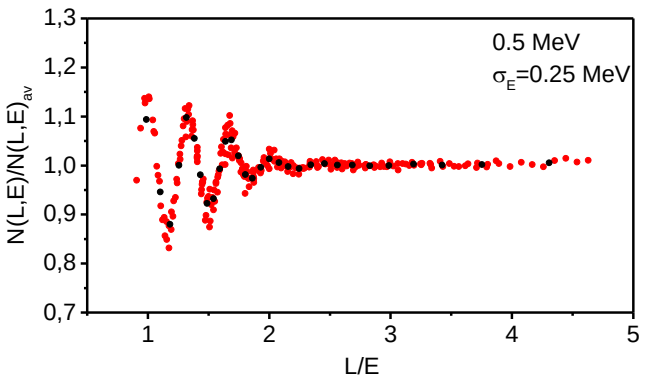


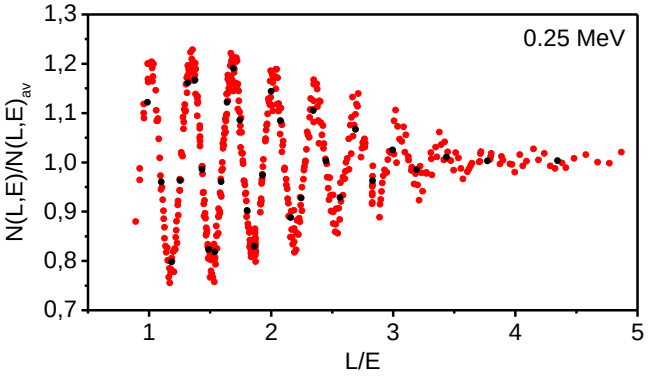


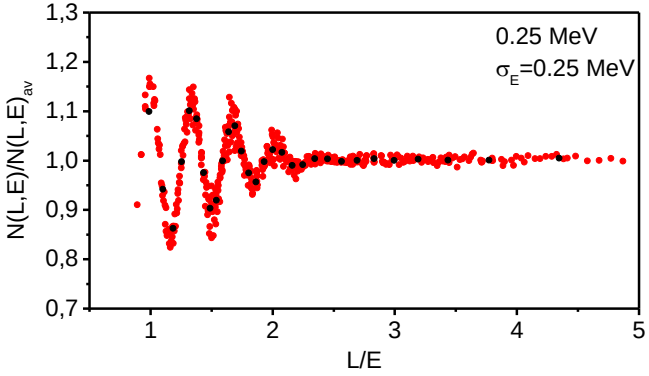


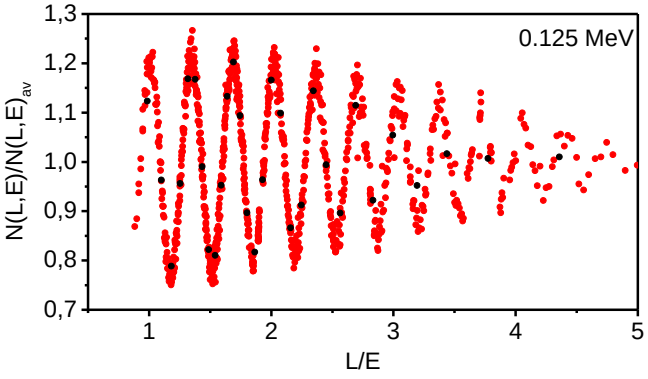
Simulation of oscillation curve

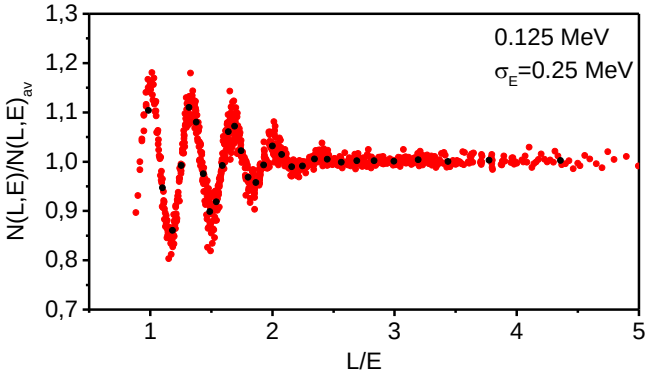




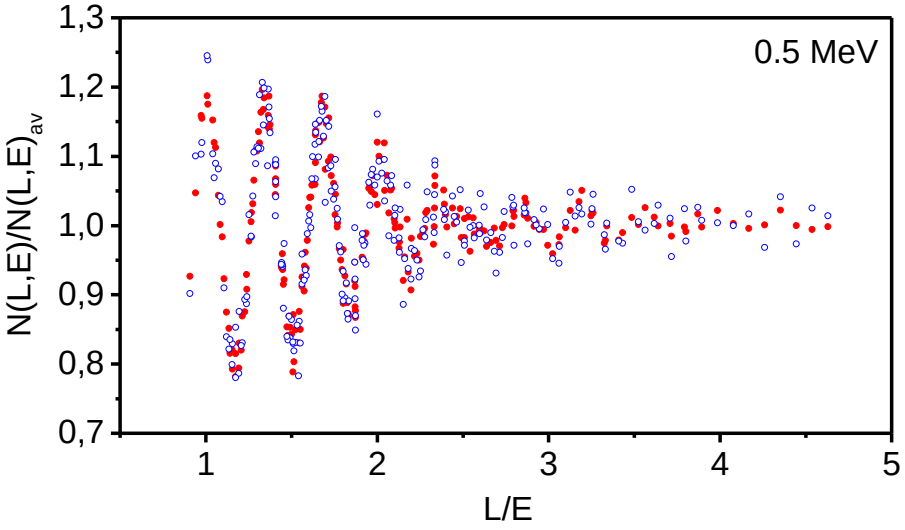


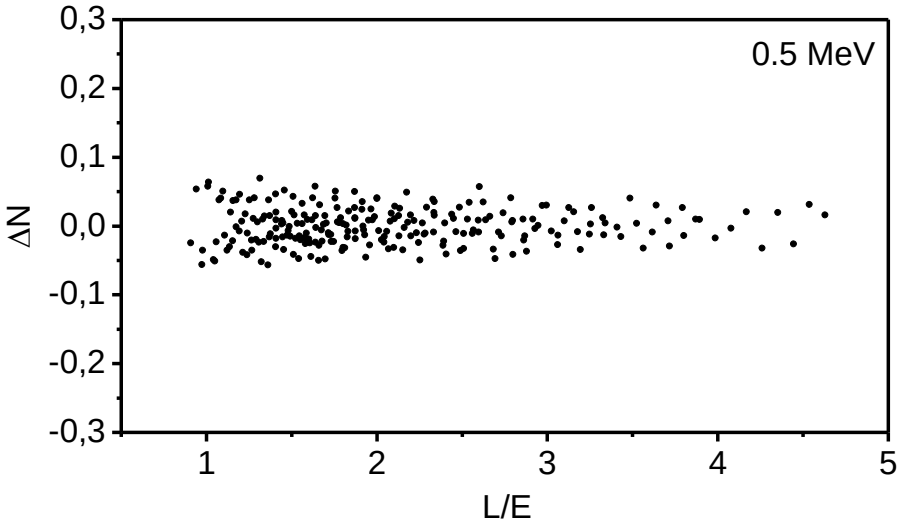


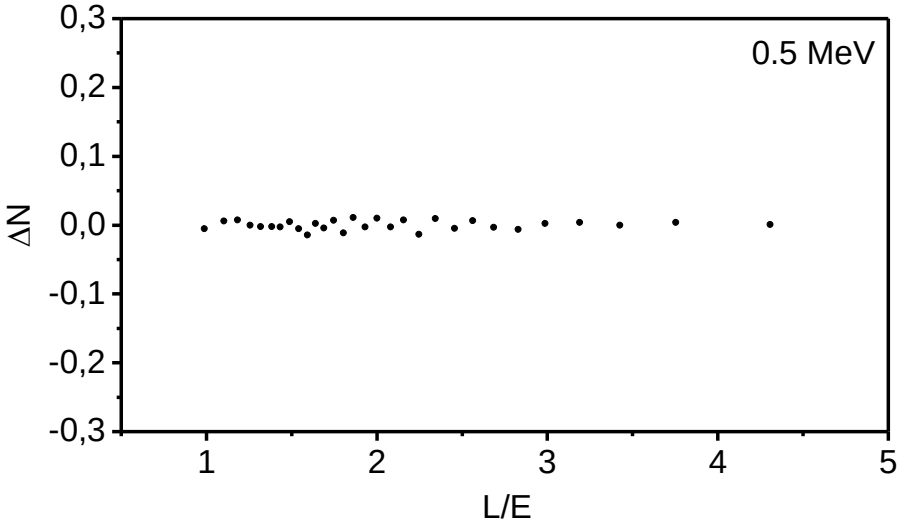




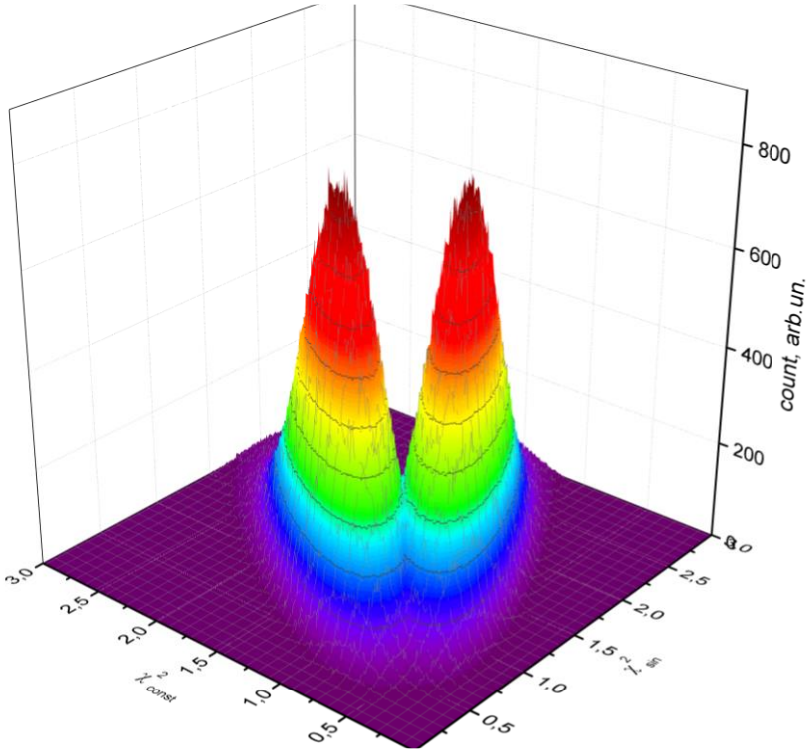
Simulation of the oscillation effect considering deviations of the detection efficiencies

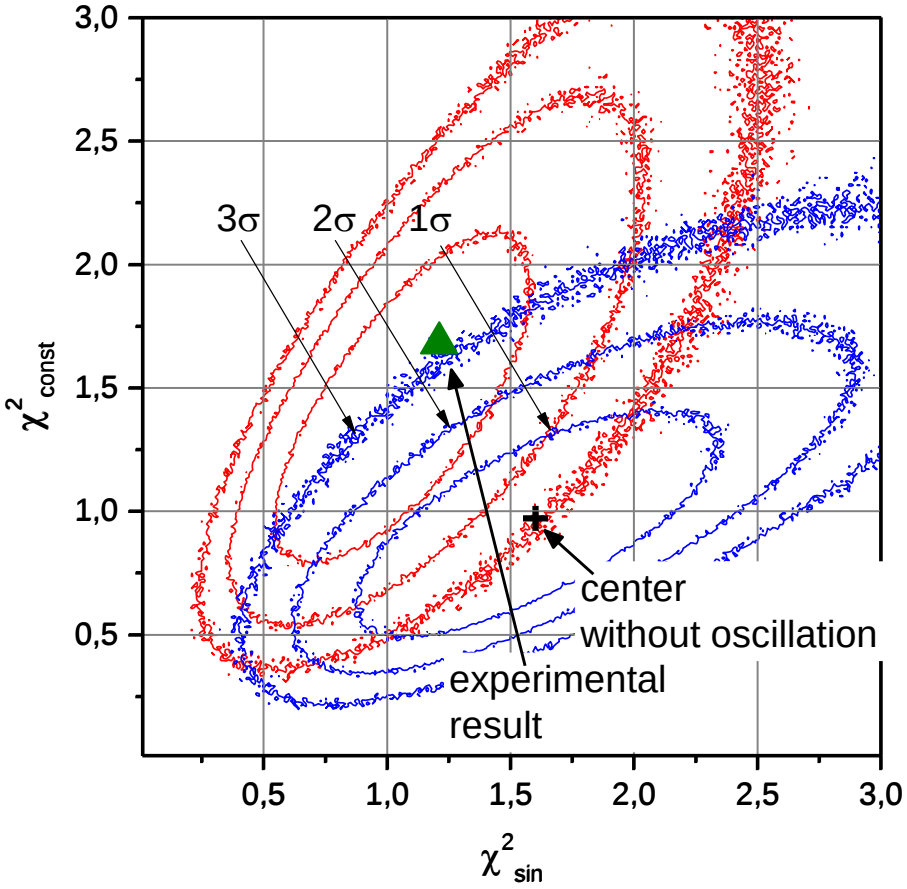




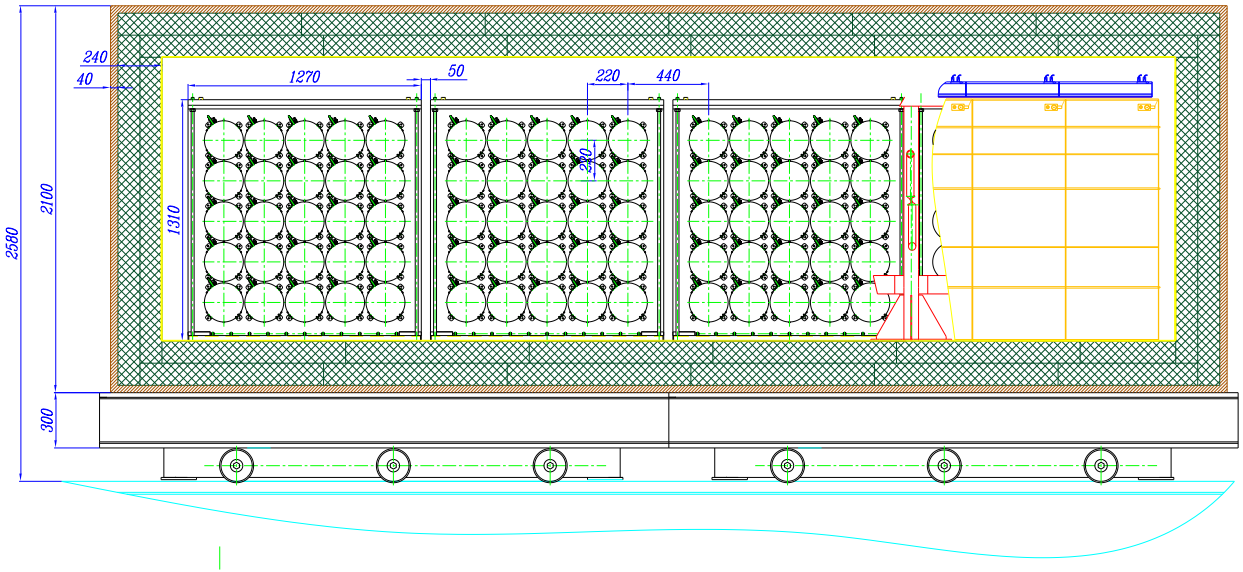


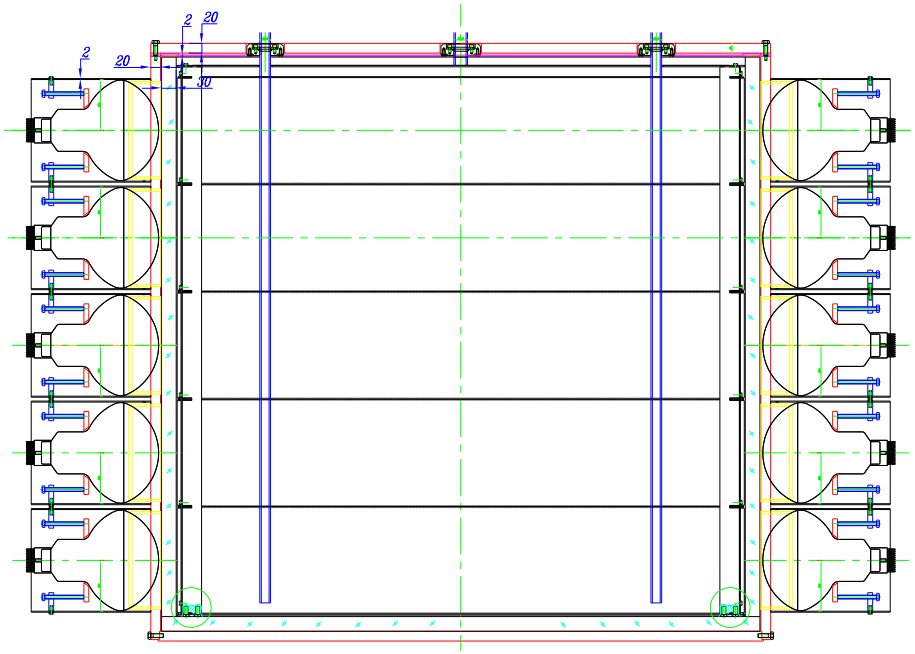
Simulation of the experiment with taking into account obtained statistical accuracy

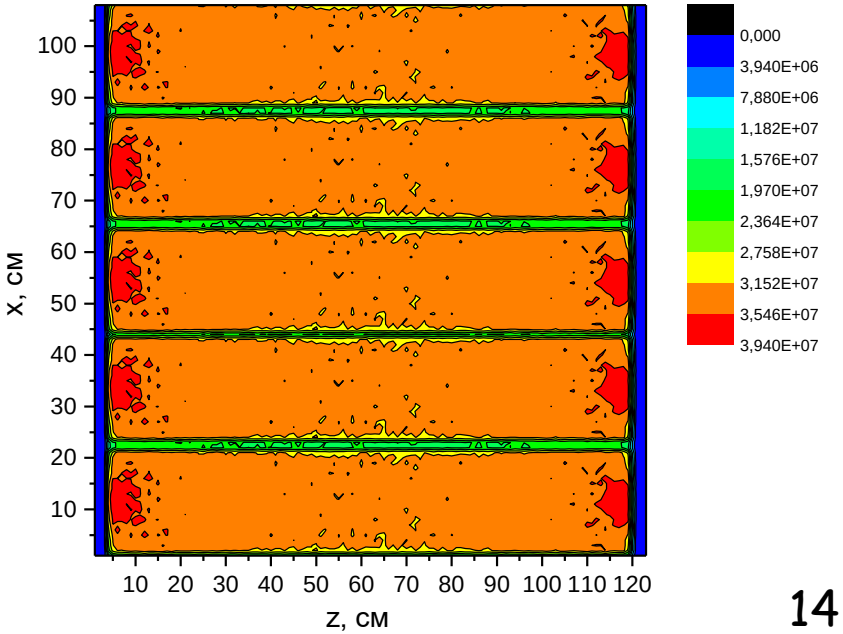




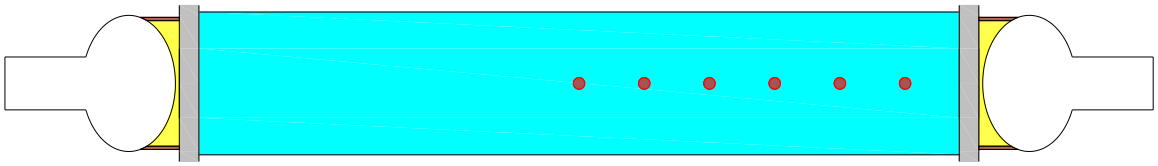
New detector

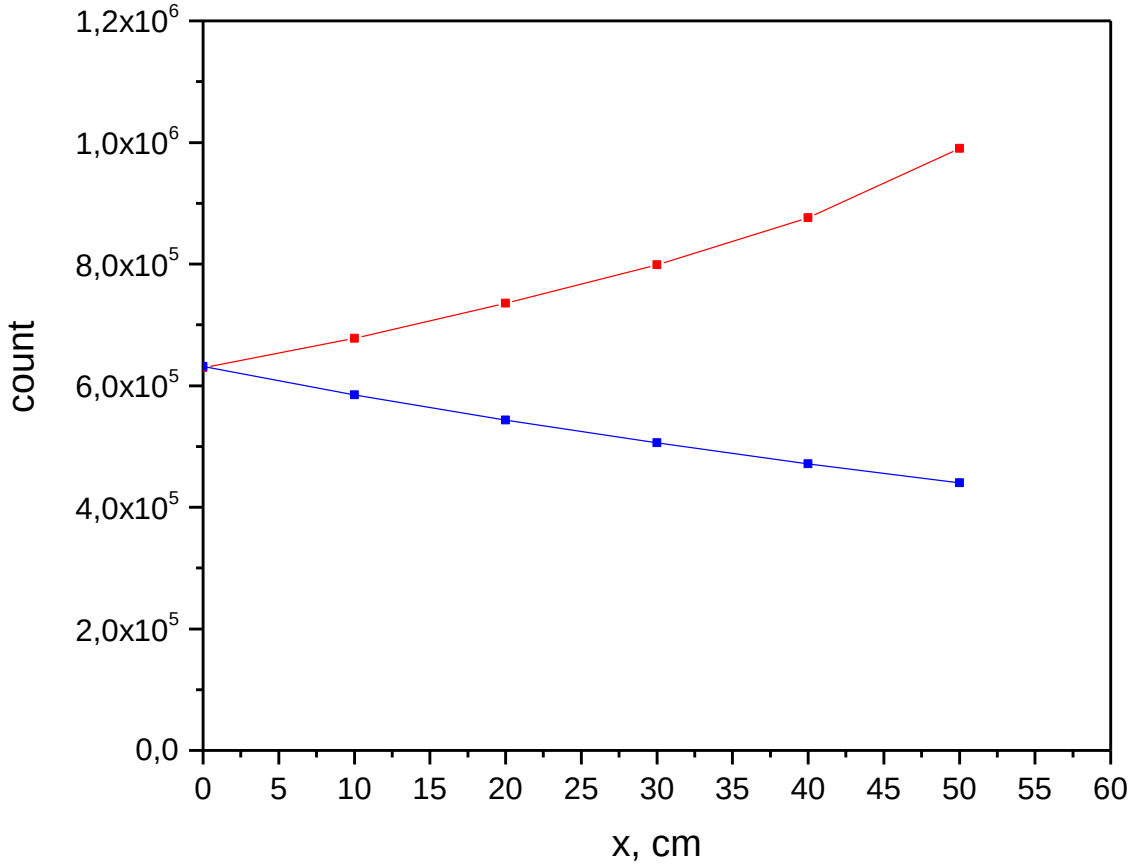




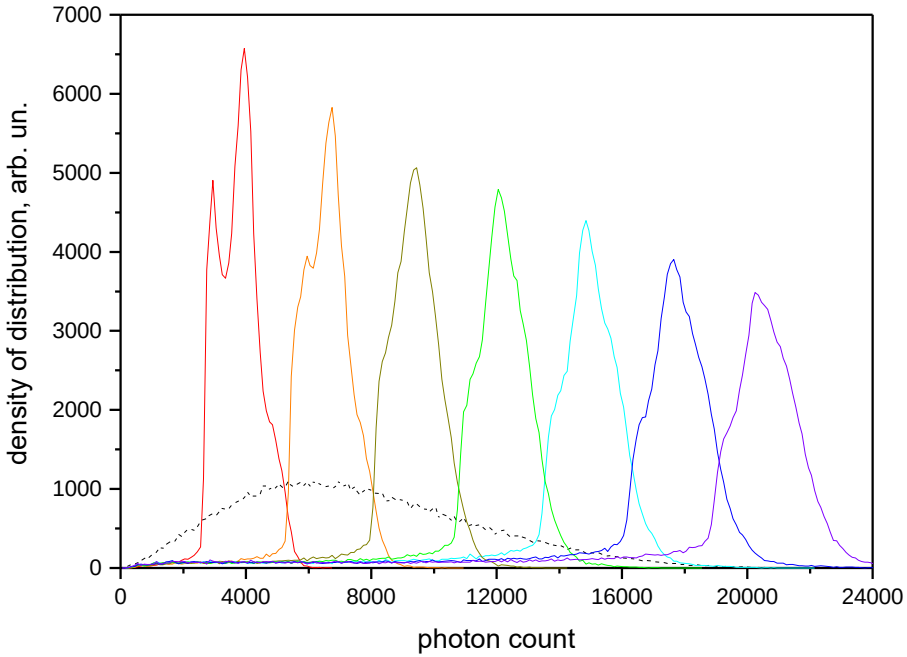


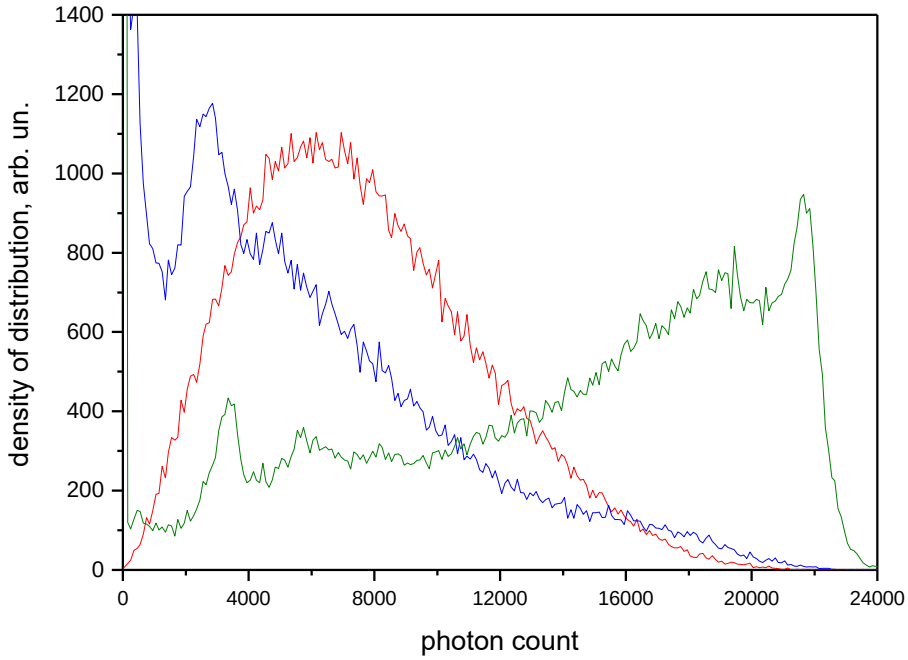
Simulation of one detector section



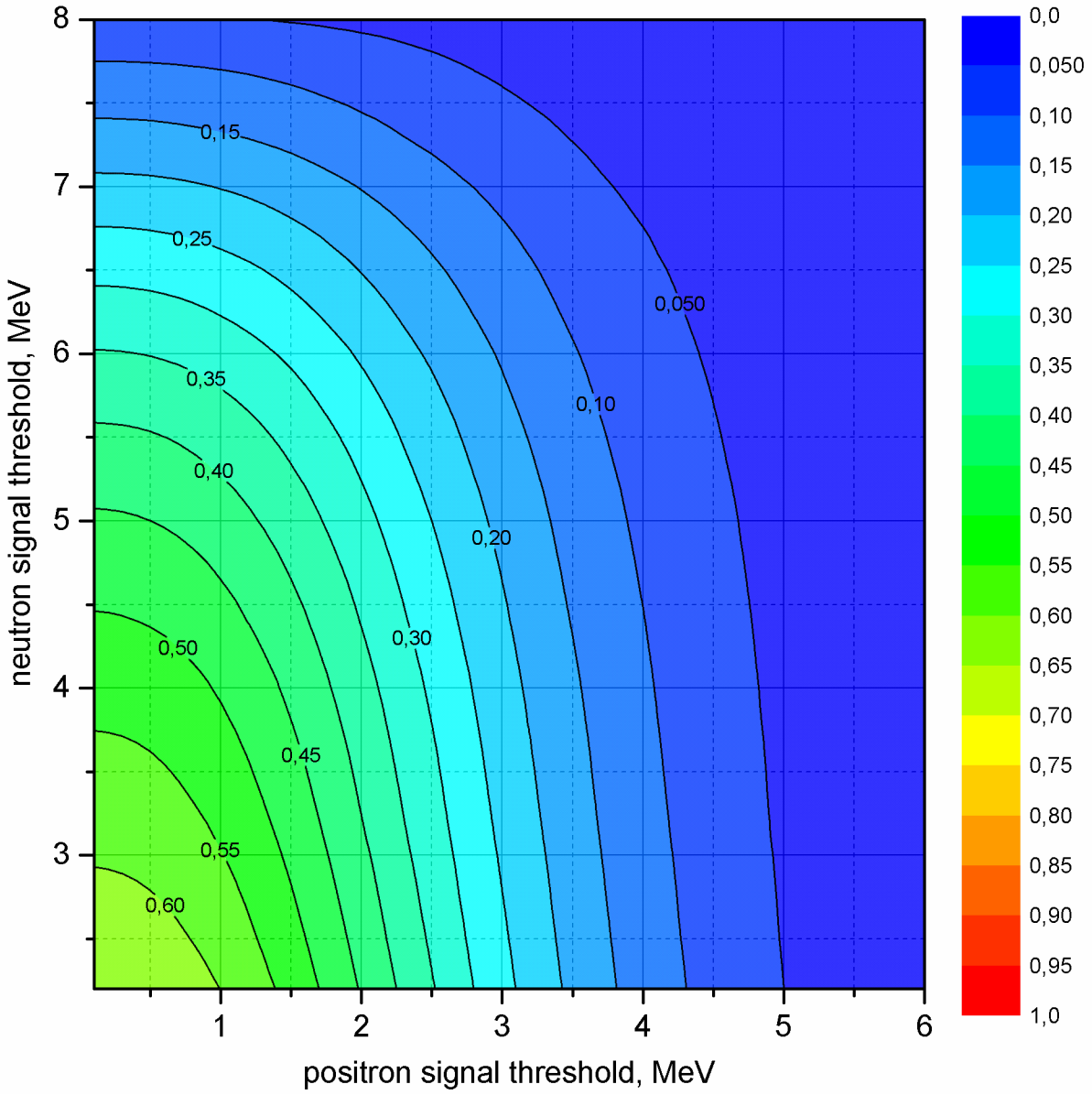


Signals in detector

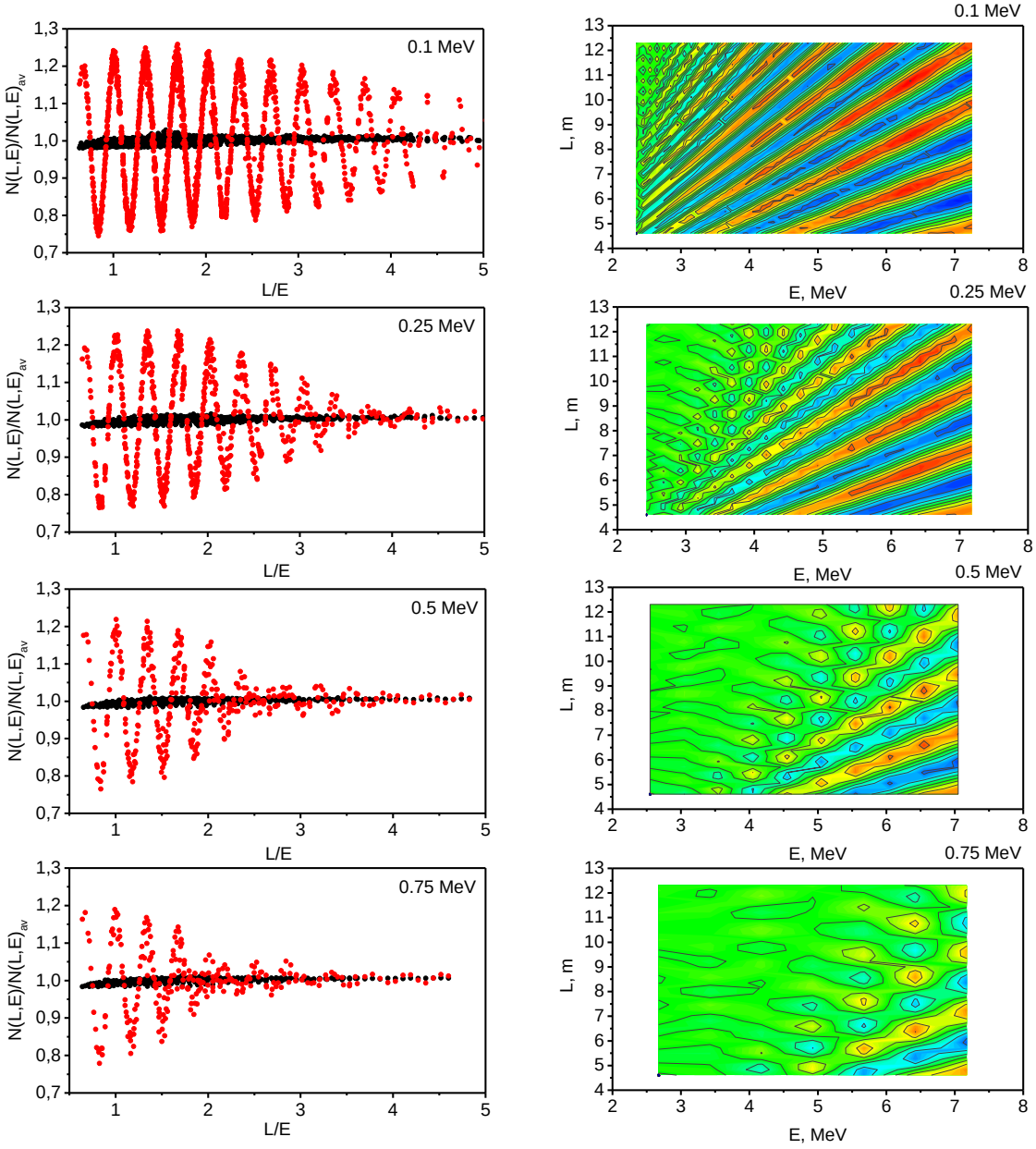




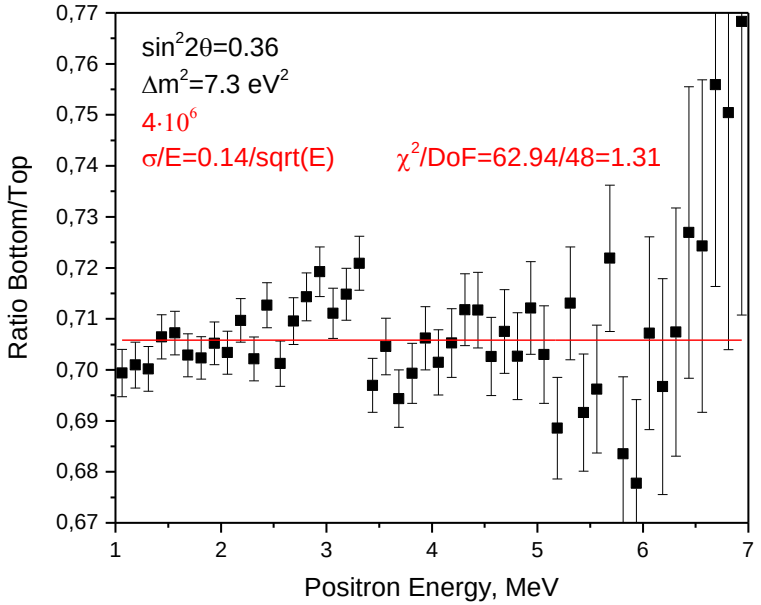
Efficiency of the detector

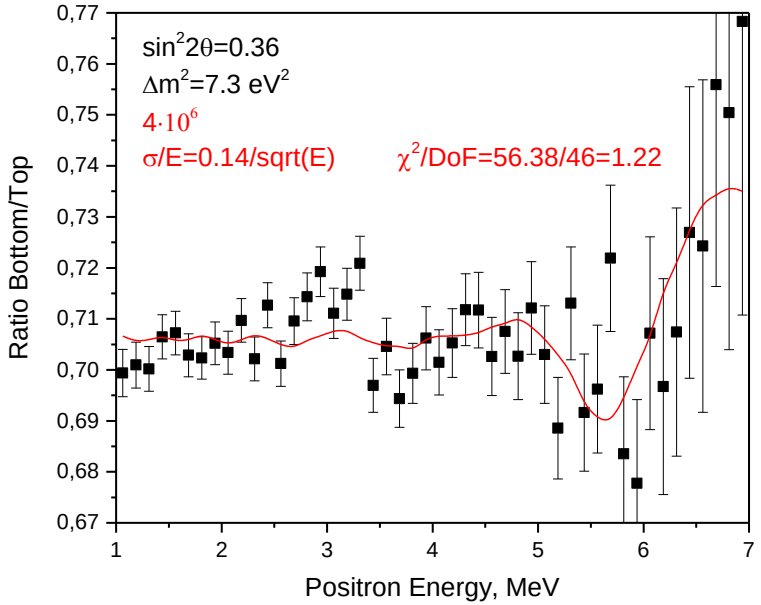


The expected effect for the different energy resolution from MC calculation

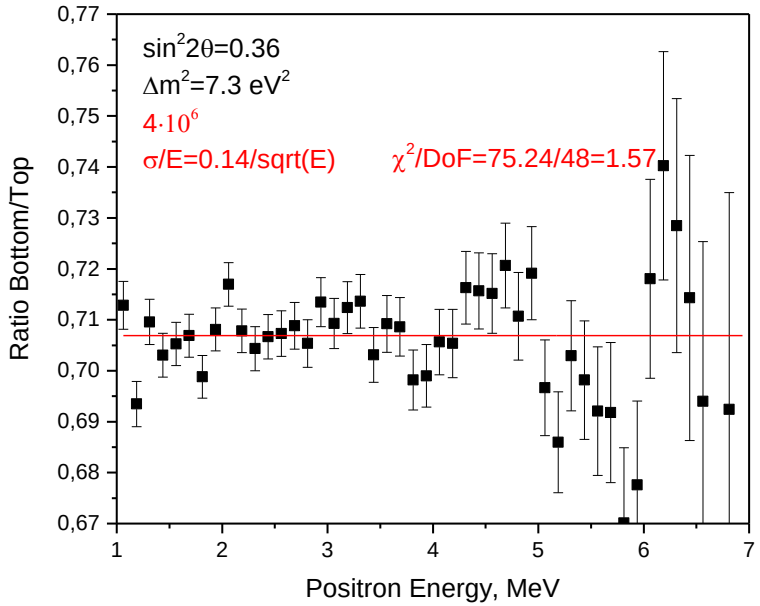


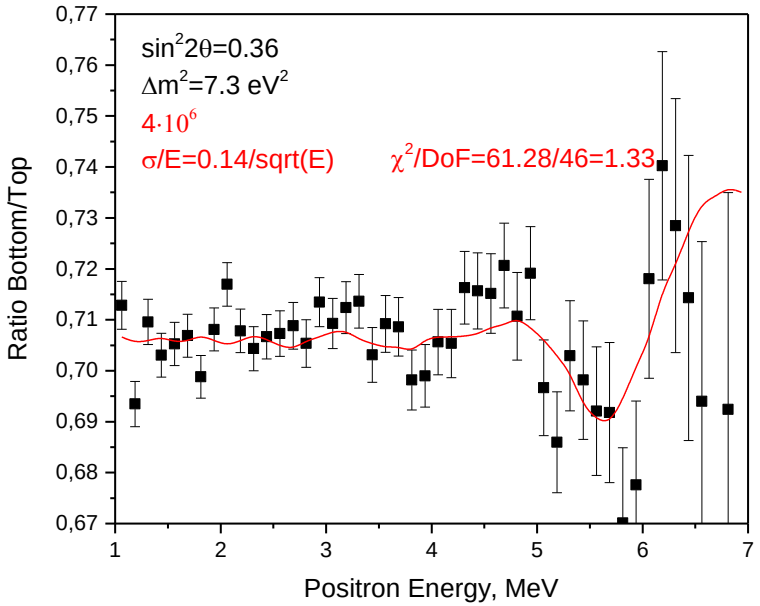
DANSS





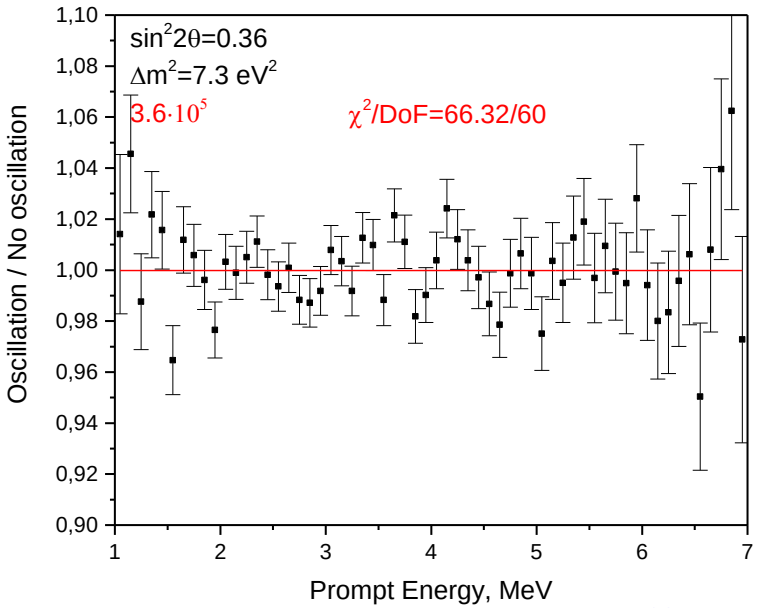
The oscillation effect is observed at 2.0 σ CL.

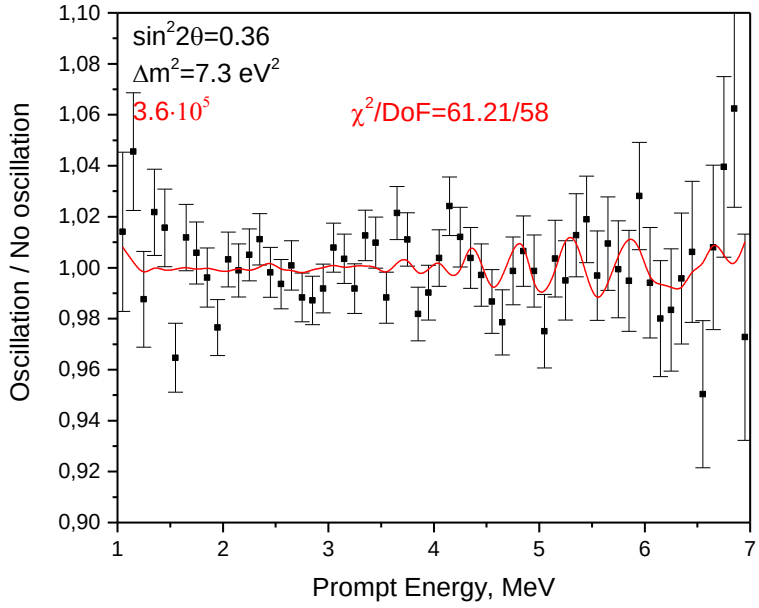




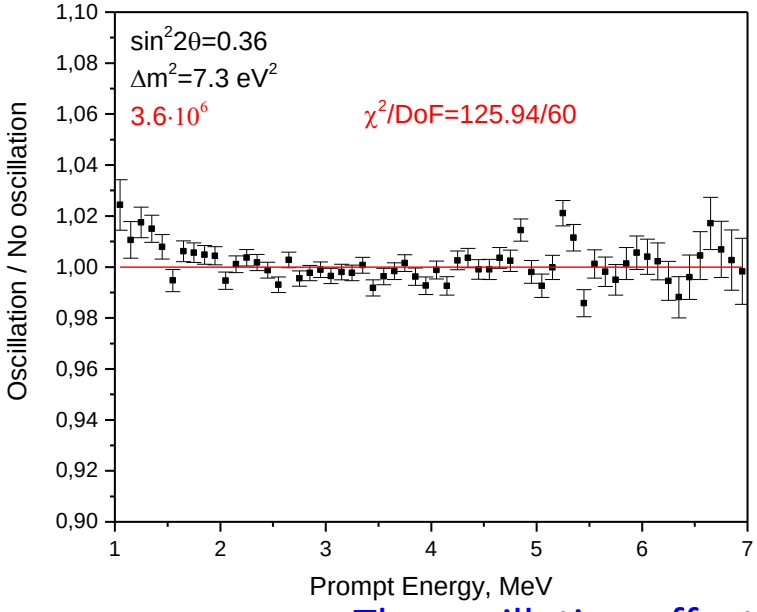
The oscillation effect is observed at 3.3 σ CL.

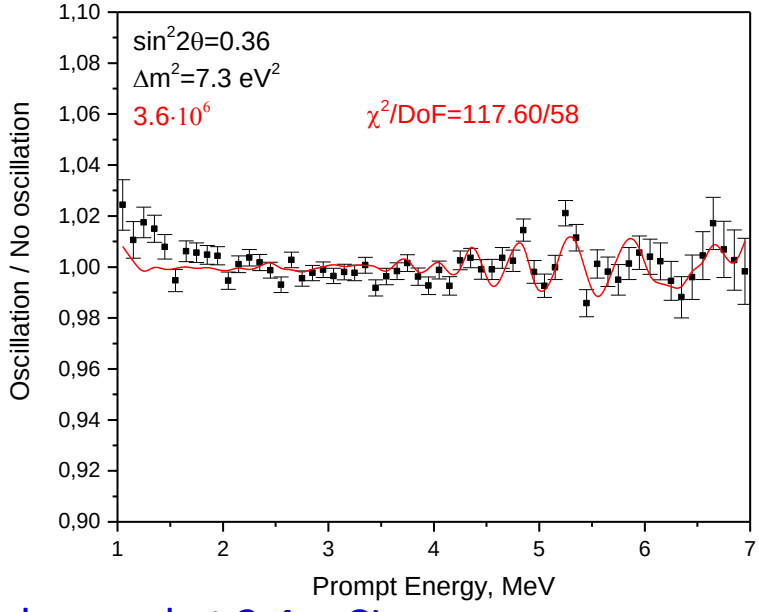
NEOS





The oscillation effect is observed at 1.8 σ CL.





The oscillation effect is observed at 2.4 σ CL.

Conclusion

1. MC simulation provided the basis for the current Neutrino-4 experiment at the SM-3 reactor (Dimitrovgrad, Russia).

2. MC simulation provided development and predictions for the future of Neutrino-4 experiment at the SM-3 reactor and the PIK reactor (Gatchina, Russia).