

Development of pyroelectric neutron source for calibration of neutrino and dark matter detectors

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Pyroelectric crystals, such as LiNbO₃ or LiTaO₃ being under influence of temperature gradient produce electric field up to 106 kV/cm. It was experimentally confirmed that the crystal installed in the chamber with residual gas pressure about 1 mTorr can be used for generation of X-Rays [1], electrons [2] and neutrons [3]. Due to the unique properties such as On/Off mode of operation and absence of radioactive materials pyroelectric generators seems to be promising tool for calibration of neutrino and dark matter detectors [4,5].

We have developed the laboratory experimental setup for development of pyroelectric neutron generator for calibration of neutrino and dark matter detectors [5]. The setup allows providing and controlling the neutrons generation process realized during d-d nuclear fusion. It is shown that the neutrons with energy 2.45 MeV can be generated starting from a level of electric potential generated by pyroelectric crystal about 30 kV, in contrast to the typical neutron tubes which need the applied outer high voltage level about 100 kV. The results of the neutrons observation and possible construction of the pyroelectric neutron generator are presented.

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