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Efficiency and energy resolution calculation under developing of fast neutron detector with boron-10 converter

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Under developing new position-sensitive ionization detector of fast neutrons with energies above 1 MeV events of ^{7}Li and ^{4}He nucleus emission from ^{10}B layer is simulated. Detector gives possibility to determine direction of nucleus emission due to signals from anode and pairs of cathodes and grids. Ionization signals from detector gas gaps is proportional to the partial and total ionization losses of the nucleus. Nucleus is identified and its energy is determined by above magnitudes. Energy of incident neutron is calculated from reaction kinematics. Expected relative resolution of neutron energy is $\sim 6\%$. Choice of high signal threshold suppresses registration of ^{4}He nucleus and other types of radiation and provides monotonic dependence of loss on ^{7}Li nucleus energy. Detector efficiency in the energy range from 1 to 7 MeV varies slightly and is estimated as $\tilde{}\ 10^{-7}$ [1, 2]. Thus, it becomes possible to determine energy and coordinates of neutron without measuring the time of flight.

1. S. Potashev et al. // KnE Energy & Physics. 2018. P.115.
2. S. Potashev et al. // EPJ Web of Conferences. 2020. V.231. P.05010.

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