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Flux Peaking of 7-12 keV Deuterons at Channelling in TiD₂ Crystal and Enhancement of Neutrons Yield in d(d,n)³He Reaction

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The energy dependence of the neutrons yield from d(d,n)³He reaction at deuterons energy 7÷12 KeV in the textured TiD₂ target (the micro crystals are aligned mainly along <100> direction) was studied recently in [1] using pulsed plasma Hall accelerator with closed electron current (PHA). In Ref. [2] the authors investigated the neutron yield in the same reaction using textured CVD-Diamond and 30 KeV deuteron beam from HELIS accelerator with small angular and energy divergences. The authors of [1-2] suggested that the observed enhancement of neutron yield is connected both with the screening and channeling effects.

To clarify the role of channeling in enhancement of neutrons yield in d(d,n)³He reaction in TiD₂ crystal target, we present here the results of computer simulations. The deuterons trajectories in a TiD₂ crystal are simulated using the computer code Basic Channeling with Mathematica™ (BCM-1) [3], which allows calculate angular and spatial distribution of channeled particles in a thin crystals, see e.g. [4]. The simple model to calculate the reaction yield revealed the remarkable orientation effect directly connected with flux-peaking of deuterons in a crystal. The comparison with experimental data [1] is performed.

References

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