

Properties of a compact neutron supermirror transmission polarizer of new type

In paper [1], a new neutron transmission supermirror kink polarizer was proposed and briefly reviewed. In paper [2], a proposal was considered to increase the luminous intensity of this polarizer by adding a second element, a direct polarizing neutron guide. At the same time, the angular range of the outgoing beam with high polarization has increased significantly, several times. This polarizer is designed to operate in small magnetic fields, in which the remanent properties of polarizing supermirrors can be used. In paper [3], a polarizer was considered in which its elements (kink and direct polarizing neutron guide) were in saturating magnetic fields. In addition, a spin-flipper has been added between these elements. It is shown that the basic parameters of this polarizer are high and it can be used for a number of neutron physics facilities of the new PIK research reactor (PNPI NRC “Kurchatov Institute”). In this report, the polarizer under consideration with a new magnetic system is discussed. The use of this magnetic system makes it possible to optimize the polarizer design and reduce its length. The main parameters of the polarizer are obtained and discussed depending on the characteristics of the elements of this polarizer. The polarizer under consideration is compared with known neutron transmission polarizers.

[1] V.G. Syromyatnikov, V.M. Pusenkov. New compact neutron supermirror transmission polarizer. - Journal of Physics: Conf. Ser. 862 (2017) 012028.

[2] V.G. Syromyatnikov. “New neutron transmission supermirror remanent polarizer” . The paper in arXiv:1911.02936 [physics.ins-det].

[3] V.G. Syromyatnikov. “About using of a compact supermirror transmission polarizer in the neutron research facilities of the PIK reactor” . The paper in arXiv:2412.00223 [physics.ins-det].

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