

Stationary Magnet of Neutron Flipper-Decelerator for the UCN Source at a Periodic Pulsed Reactor

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The main idea of the UCN source in pulsed reactors is the pulsed accumulation of UCN in a trap [1]. The neutron density accumulated in the trap depends on many factors. They include: the duration of the bunch at the entrance to the trap, the efficiency of transportation, absorption by the walls of the trap itself, etc. In the absence of special steps, the necessary distance of the trap from the place where UCN were produced leads to the spreading of neutron bunches during the transportation of UCN to the trap. As a result, the pulse structure of the beam disappears, which makes the idea of pulse accumulation impossible.

In work [2], it was shown that in the case of large deceleration of very cold neutrons (VCN) by some local device, which can be an adiabatic spin flipper operating in high magnetic fields, the flux of VCNs, which after deceleration are converted into the UCN, has a pulse structure. In this case, the duration of neutron bunches can be significantly less than their repetition period. Accordingly, the density of the neutron flux in the bunch will significantly exceed the average value.

The report is devoted to the design of an adiabatic spin-flipper with a magnetic field of about 20 T.

1. Shapiro F.L., PEPAN 2 (4) (1971) 975–979.
2. Frank A.I., Kulin G.V., Zakharov M.A. “On a New Possibility of Pulsed Accumulation of Ultra Cold Neutrons in a Trap”. Phys. Part. Nuclei Lett. 20, (2023) 664–667.