

ULTRACOLD NEUTRON CONVERTERS

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The development of high intensity ultracold (UCN) sources is important for improving the accuracy of the experiments investigating fundamental properties of the neutron, e.g. the search for the electric dipole moment. The key to significant enhancement of UCN intensities is an efficient use of a UCN converter material. The UCN converter here is to be understood as a medium which reduces the velocity of cold neutrons (CN, velocity of about 600 m/s) to the velocity of UCN (velocity of about 6 m/s). This process is called UCN production.

Solid deuterium (D_2), oxygen (O_2) and heavy methane (CD_4) are candidate materials for use as UCN converters. They have been investigated in the experiments performed at the Paul Scherrer Institute. The UCN production from a CN beam in D_2 , O_2 and CD_4 and CN transmission through all three materials at various temperatures have been measured. In order to understand the underlying processes of the UCN production, the CN energy dependent UCN production in gaseous and solid D_2 has been measured. The experimental details and results are presented and discussed.

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