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A polarized UCN physics beam position at the FRM-2

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We present a concept for a polarized UCN physics beam position at the FRM-2. The use of a superconducting magnet with an adiabatic fast passage (AFP) spin flipper at the field maximum allows free tuning of the UCN energy spectrum. Based on work by Alefeld et al.[1] and Weinfurter et al.[2], we use the level splitting in a magnetic field of |2mB| and add a spin flip in the center of the magnetic field which doubles the level splitting to |4mB|. Therefore, the energies of the spin states will be significantly separated after leaving the magnet. We intend to use neutrons with energies above the Fermi potential of typical storage materials, which have good transport properties through UCN guides and higher available flux. By shifting the energy spectrum, a significant gain in polarized storable UCN density in the experiment should be feasible. Modifying the magnetic field and the resonant RF field further allows adjusting the UCN spectrum to different energies. The principle setup of such a beam position and MC simulations will be presented.

[1] B. Alefeld, G. Badurek and H. Rauch, Z. Phys . B41 (1981) 231
[2] H. Weinfurter, G. Badurek, H. Rauch and D. Schwahn, Z. Phys . B72 (1988) 195

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