ICANS-VI

INTERNATIONAL COLLABORATION ON ADVANCED NEUTRON SOURCES June 27 - July 2, 1982

POLARIZED NEUTRON TECHNIQUES AND APPLICATIONS"

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ABSTRACT

Among the possible uses of a polarized, polychromatic neutron beam emitted by a pulsed source is the study of medium and high energy excitations in solids and liquids with high energy resolution. This can be achieved with an instrument that combines the capabilities of the resonance detector spectrometer with those of the spin-precession analysis.¹ As first step toward the realization of such an insturment, a device has been constructed that filters the spins of a polychromatic neutron beam. The device consists in a polarized proton target, that selectively scatters away from the beam neutrons of one spin state only. The target is made of an hydrogenated crystal containing paramagnetic ytterbium; the polarization of the hydrogen nuclei is obtained indirectly, <u>via</u> the polarization of ytterbium, by a method called spin refrigeration.² The first neutron tests of the device at the Intense Pulsed Neutron Source at Argonne are quite promising.

^{*}Work supported by the U.S. Department of Energy

¹G. P. Felcher and J. M. Carpenter, Nuclear Insturments and Methods, 192, 513 (1982).

J. Button-Shafer, R. Lichti and W. H. Potter, Phys. Rev. Letters, 39, 677 (1977).