

The first UCN counting from He-II spallation UCN source

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The construction of an ultra cold neutron (UCN) source was finished on Dec. 21, 2001. (See Fig. 1) In the UCN source, spallation neutrons are cooled down to UCNs in superfluid helium (He-II) as shown in Fig. 2.

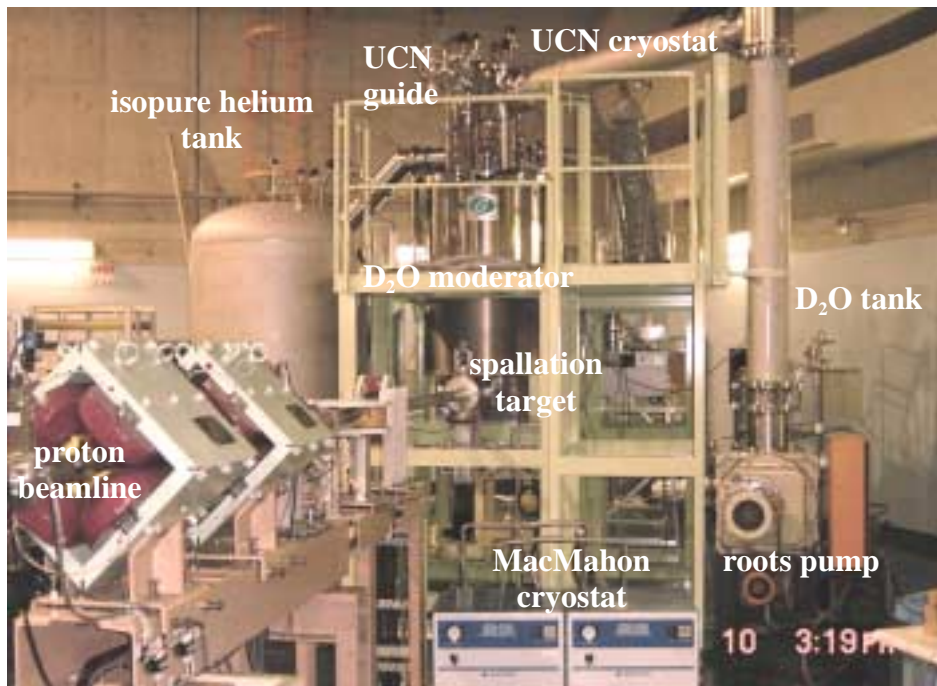


Fig. 1 Front view of spallation UCN source.

A proton beam impingement was started on a spallation target in the midnight of Dec. 28, 2001. A UCN time spectrum was observed in the early morning of Dec. 29, 2001. (See Fig. 3.) The UCN time spectrum was obtained by a neutron counting as a function of time after switching off the proton beam. The temperature of He-II was 1.1 K. No temperature raise was observed when the proton beam was switched on. The UCN count become small at >2 K,

when ^4He pumping was switched off. The result confirmed the time spectra resulted from the UCN production in He-II. At the higher temperature, the life time of the UCN becomes very short because of phonon up-scattering, therefore, the UCN counts become very small.

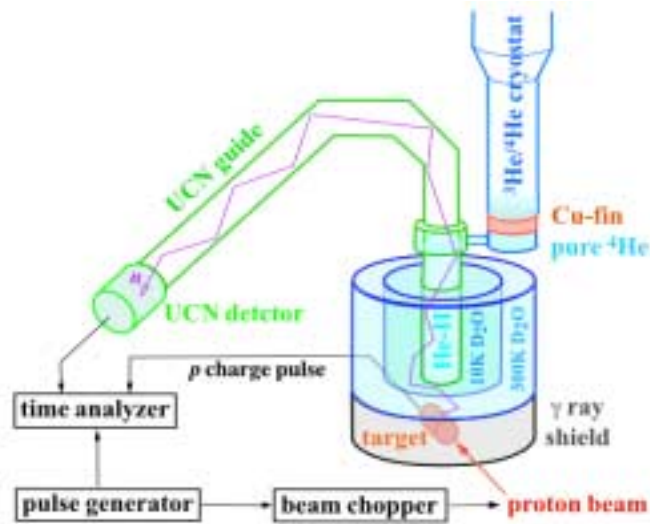


Fig. 2 UCN production in spallation UCN source. Spallation neutrons in MeV region are produced upon a proton beam impingement. MeV neutrons are cooled down in thermal and cold neutron moderators to cold neutron region. Cold neutrons are converted to UCNs in the He-II and then guided to a UCN detector. The proton beam is pulsed by a master pulse generator. The proton current is transformed to digital pulses, charge pulses. Neutron pulses from the UCN detector and the proton charge pulses are simultaneously counted as a function of time in a time analyzer, a VME module.

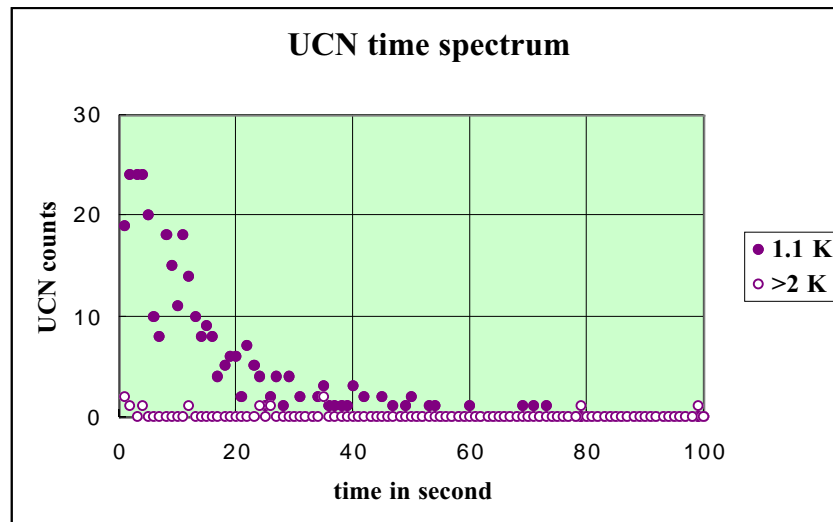


Fig. 3 The first UCN production. Closed and open circles are neutron counts at 1.1 K and 2 K, respectively.