Liquid Scintillation array for fast neutron spectrocsopy

An array of 18 liquid scintillators (LS) is set-up for fast neutron spectroscopy. Each liquid scintillator is a 5-inch diameter and 2-inch long cylindrical Aluminum Cell coupled to a 5-inch diameter fast PMT. These detectors have very good timing and also pulse shape discrimination (PSD) properties. Therefore, exploiting the time of flight techniques and PSD, it is possible to have unambiguous detection of neutrons among the gamma-ray background. The array has been characterized for measurements of both electrons using radioactive sources and fast neutrons using (p,n) reaction.

Fig.: Existing LS array at PLF

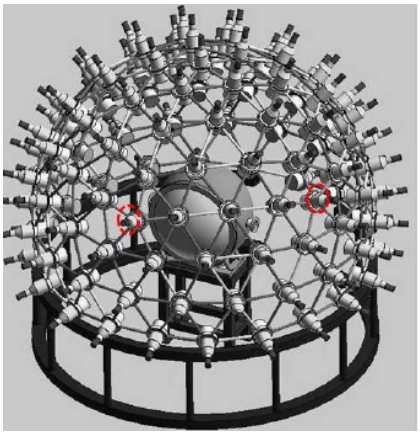

Fig.: Proposed array to measure cross section~1ub/sr

The existing LS array has been used to measure the pre-equilibrium cross section in the reaction, study of nuclear level density to address fade out of the collective enhancement with excitation energy in the mid-shell nuclei, precession neutron multiplicity to study fusion-fission dynamics and also exclusive measurements involving coincidence of neutrons. An array of 80 LS is being planned to increase granularity, improve statistics in few days counting and also capable to measure the cross section down to 1 μb/sr.