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Proposed fast neutron beam facility at VECC and its possible applications

Quasi-monoenergetic neutrons can be produced using (p, n) reactions in light mass target nuclei. In particular metallic 7Li and 9Be targets can be used as they are easy to handle compared to the gaseous targets. VECC medical Cyclotron provides the proton beam of energy 15 to 30 MeV and current of a few hundreds μA. This machine can be used to produce quasi-monoenergetic neutrons. Available neutron energy in this case would be in the range of 13 to 28 MeV and neutron flux of the order of 1010 n/cm2 (for 50 μA proton) can be produced. Neutron beams can also be produced using primary electron beams. Here the process is two steps; first the production of bremsstrahlung photons using (e, γ) reaction followed by (γ, n) reaction in a suitable target. For photo-neutron reaction 9Be target can be used as it has low threshold (1.66 MeV). Electron Linac is being developed as part of the ANURIB project. This can be utilized to generate secondary neutrons for different experiments. Finally I shall discuss a few key nuclear physics experiments that can be performed using the fast neutron beam facility.

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