

Studies in Nuclear Structure & Nucleosynthesis Using Low and Medium Energy Proton Beam

I. Mazumdar

Tata Institute of Fundamental Research, Mumbai 400 005, India

Heavy-ion induced reactions have been playing a preeminent role in low and medium energy nuclear structure and reaction studies for well over last five decades. However, notwithstanding the dominion of heavy-ion physics, the light-ion induced reactions continue to remain relevant for both fundamental and applied research in nuclear physics. Continued efforts of over seven decades have yielded a huge body of information, both experimental and theoretical, from proton induced nuclear reactions. Proton induced elastic and inelastic scattering and capture reactions, provide crucial insights on structures of ground and low lying excited states, Giant Dipole Resonances (GDR) built upon ground and low lying states, possible cluster states in light nuclei etc. Proton induced scattering and capture studies have proved to be invaluable for testing nuclear reaction models and also nature of nucleon-nucleus interactions. Another important dimension of proton induced capture reaction is studies in nuclear astrophysics, namely, nucleosynthesis. Cross sections and astrophysical S factors of proton induced capture reactions ranging over few tens of keV to MeV provide information of element formations in different astrophysical environments and epochs. Moving over to applied physics, proton induced capture and scattering reactions are important in materials science, trace element analysis, reactor physics and power generation.

At TIFR, we have initiated a broad program to study important reactions of Nuclear Astrophysics and also nuclear structure at low excitation energies using low to medium energy proton beams from existing facilities in the country. In this talk I will summarise some of these efforts and present very new measurements. The talk is primarily aimed to create renewed interests in light ion induced reactions and revisit many unresolved problems of nuclear physics.