Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad - 500107

Seminar

Towards all-optical, compact sources of ions and neutrons - current research activities at QUB

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The study of intense laser driven acceleration mechanisms and their optimization, have been, over the past two decades, very active areas of research. Demonstrating capability of a controlled, all-optical acceleration of protons and other low-Z ion species in the 60-300 MeV/nucleon range would be of significant interest for therapy of deep-seated cancer. Emerging laser-driven ion acceleration mechanisms, including the Radiation Pressure Acceleration (RPA) approaches, are highly promising for this purpose and currently pursued internationally. A novel scheme of guided post-acceleration of the laser driven ion beams was recently developed, which brings the all-optical scheme one step closer to the realization of compact beam lines. Recent developments on both RPA from ultra-thin foils and post-acceleration using helical coils will be presented.

An appealing beam of ions will not only be useful for their direct application in science, industry and healthcare, it can be useful towards developing secondary particle sources, such as neutrons. An ultra-short, directional burst of fast neutrons would have a wide-ranging application, including material testing for fusion energy research, fast neutron radiography, neutron resonance spectroscopy etc. Recent experimental data not only show production of high flux, forwardly peaked neutron beams, neutron spectroscopy itself proved to be an extremely useful diagnostic to characterize and optimize the acceleration mechanism of their parent ions. The development of beamed sources of fast neutrons has also brought new light for developing compact sources of moderated neutrons in the epithermal and thermal regions, the spectral range for the mainstream neutron science applications. Recent activities on developing compact sources of slow neutrons will be discussed.

Monday, Apr 15th 2019

11:30 AM (Tea/Coffee at 11:00 AM)

Auditorium, TIFR-H