Area Seminar

Title	Laser Wakefield Accelerator: Towards Gamma-Rays
Date and Time	20/10/2011 16:00:00
Speaker	Dr. Md. Ranaul Islam Physics Department, University of Strathclyde, Glasgow,UK
Area	Theoretical Physics
Venue	Room No. 469
Abstract	Particle accelerators are used in many areas of the physical and biological sciences. The conventional accelerators employ radio-frequency electric fields to accelerate charged particles. However, the maximum electric field that can be used is limited by electrical breakdown in the beam pipes, so that accelerating particles to high energies requires a very long accelerator (the largest machine at CERN is 27km in circumference). Laser-driven plasma accelerators offer a way to make particle accelerators much more compact (centimeter range). The attraction of this method, being investigated experimentally and theoretically, lies in the propagation of intense laser pulses in a few cm under-dense plasma, which can accelerate GeV electron beams by utilizing the huge longitudinal electrostatic fields produced by displaced electrons. In a recent work, we have shown that these forces create a bubble-like ion structure, and the transverse restoring force in such ionic-background leads to the emission of intense femtosecond duration gamma-ray betatron radiation [1]. Such femtosecond duration gamma rays could be used to probe the structure of matter on unprecedented length and time scales. [1] S. Cipiccia, M. R. Islam et al. Nature Physics 2011, DOI: 10.1038/NPHYS2090