



A Vision for Laser Induced Particle Acceleration and Applications

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Large particle accelerators like CERN and GSI have for more than half a century been at the vanguard of nuclear and particle physics revealing the fundamental building blocks and forces of nature. However the size and cost of these are fuelling serious efforts to develop new and more compact accelerator technologies. Recently it has been shown that ultra-intense lasers, via plasma conditions, can generate high intensity beams of electrons, photons, protons, neutrons and heavy ions. This talk will describe some of the experiments which have been carried out as proof of principle of this new field. The experiments which will be described were mostly carried out on large single pulse lasers which equally are large accelerators. One of the important applications of compact high power lasers is to PET isotope production and in the longer term to proton oncology.

However the future of this exciting field could be further developed by intense counter propagating laser beams which in principle could produce beams of positrons, muons and pions and even create particles from the vacuum. This of course could lead to γ - γ colliders. The possibility of creating Unruh radiation will also be discussed.

This talk will be presented at a level that can be understood by non-specialists and so both staff and students and even those who know little about nuclear, particle and laser physics will be welcome.