Laser Energised Travelling Charge Accelerator (ALETCA) – A cost effective solution for healthcare applications

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Technology description

The project aims to develop a low cost, cutting edge platform technology able to deliver a highly compact proton accelerator. Proton accelerators are machines of growing importance in several industries, particularly in their use in therapy of cancer. Based on increasingly affordable laser systems (currently under a few £M compared to ~ £100M for the conventional accelerators and beam delivery system used in cancer therapy), the LETCA is a robust and revolutionary design that will have further advantages in terms of low operational cost, compactness, radiation protection and greater flexibility. The interaction of intense lasers with samples creates extremely high potential gradients, several orders of magnitude beyond the limit of conventional technologies. LETCA ingeniously harnesses the resulting electric field to act simultaneously as an accelerating, focussing and energy selection device. A specific interest is that, by utilising the LETCA device, lasers can be transported close to the application area circumventing the delivery beam-lines (~20M) and radiation shielding costs (~30M) associated with a conventional machine.

A significant marker for laser-based therapy device is foreseen due to growing demand – NHS is investing 250M for developing two proton therapy centres in UK by 2017, and until then plans to continue spending £30M per year sending patients overseas for treatment in the handful of prohibitively expensive facilities abroad.

LETCA has passed an early stage of development with a conceptual experimental prototype and strong IP position. With further investigations of a number of fine details of the prototype and its experimental validation at high power laser systems, the final goal is to derive a proof-of-concept prototype for end-user applications. In light of the recent progress in laser technology and the projected market dynamics, the proposed work has a clear strategic importance and would lay the foundation for next generation proton therapy with enormous potential for commercial investment. In order to complement the technology development, provisions for its commercialization under 5 years will be explored in collaboration with potential commercial partners.

Institution

The Queen's University of Belfast

Inventors

Satyabrata Kar
Research