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### Laser driven ion acceleration towards medical applications: Current status of the A-SAIL project

A-SAIL (Advanced Strategies for Accelerating Ions with Lasers) is a UK-wide consortium aimed to the development of ion acceleration towards medical applications. The main objective of the project, which is funded by an EPSRC Program Grant (2013-2019), is to assess the potential of the laser-driven ion approach as an alternative source for cancer therapy, by demonstrating controlled, all-optical acceleration of dense bunches of protons and other low-Z ion species in the 60- 300 MeV/nucleon range of interest for therapy of deep-seated cancer. Radiation Pressure Acceleration approaches are highly promising for this purpose and currently pursued by the consortium at UK and international facilities. A novel scheme of guided post-acceleration of the laser driven ion beams was recently developed within the team which brings the all-optical scheme one step closer to the realization of compact beam lines. Achieving this objective requires a coordinated effort involving development of new target media, understanding and controlling the physical processes of the relevant interaction regimes, and developing innovative solutions to a number of technical bottlenecks. The ultra-short duration is a distinctive property of laser-driven ion beams, as ions are emitted in bursts of picosecond duration at the source and their therapeutic use may result in dose rates up to many orders of magnitude higher than normally used in therapy. In parallel to the source development, the consortium is therefore pursuing a program of investigations of the dynamics of cellular response to ion irradiation at these unprecedented dose rates. The talk will discuss the aim and structure of the project, will review the progress so far and discuss the next developments and project outlook.

### Biography

Satyabrata Kar obtained his PhD. in 2005 from Queens University Belfast and is currently employed as a lecturer at QUB since 2013. He holds a Career Acceleration Fellowship from EPSRC, UK (2012-2016) and an honorary joint appointment with Central Laser Facility of STFC, UK (2017-2018). His track record includes 96 publications including 1 Nature Physics, 2 Nature communications and 19 Physical Review Letters (h-index 23 and total citation-2200).

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