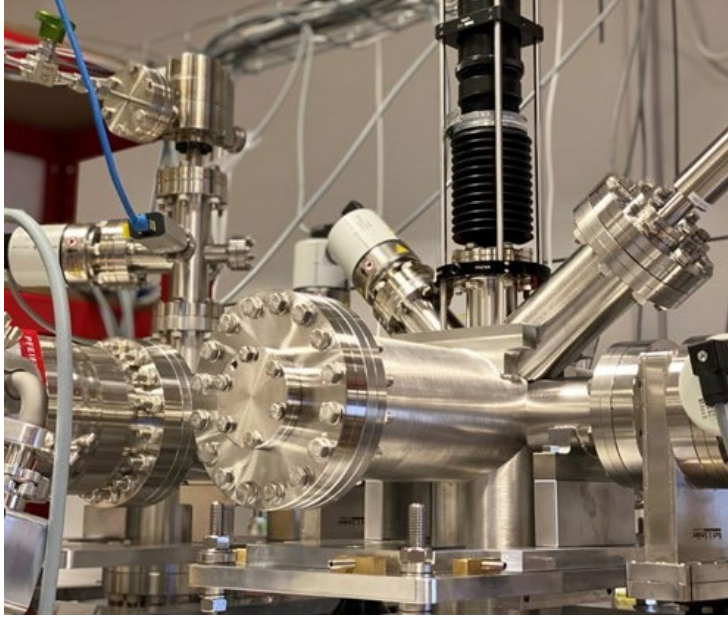
UNIVERSITY OF LIVERPOOL

QUASAR GROUP

CASE STUDY

# JetDose project set to optimise proton beam cancer therapy



## Proton beam therapy

Proton beam cancer therapy is a complex procedure that relies upon knowledge of the detailed beam properties to ensure effective dose delivery to the patient. Clinical settings currently use interceptive ionization chambers which require daily calibration and suffer from slow response times. With new and emerging treatment techniques using ultra high dose rates, there is a demand for the development of novel beam monitors, which are fast, non-invasive and calibration-free.

## The QUASAR Group

The QUASAR Group at the University of Liverpool have been successful in winning research funding to develop a novel monitoring system to help optimise proton beam cancer therapy. As part of the new project called JetDose, the Liverpool researchers will develop a new in-vivo dosimetry system based on the re-application of technologies pioneered by the QUASAR Group. The novel beam monitor will enable non-invasive in-vivo beam dosimetry in hadron beam cancer therapy.

The underpinning technology was originally developed for use with low energy antiproton beams and most recently adapted for gas jet profiling for the high luminosity upgrade of the Large Hadron Collider at CERN. JetDose will redirect this technology at the medical accelerator sector, by optimising it for the different challenges found in a treatment facility.

## Novel non-invasive beam and dose monitor

The non-invasive means of producing a profile image will allow the monitor to be run online alongside treatment operation. As the intensity in the images directly depends upon the beam intensity, and therefore the dose, an image collected with this system provides to the operator of the device an in-vivo dose map of the beam being delivered to the patient in real time.

The provision of a novel beam and dose monitoring system is expected to be of paramount importance to the increasing number of hadron therapy centres, and upgrades of existing facilities worldwide. *JetDose* will capitalise on this market growth and has collaborated with our spin-out company D-Beam Ltd, and received the support of the Clatterbridge Cancer Centre (CCC), one of the UK's leading cancer care centres and Fondazione CNAO, a cutting edge hadron therapy facility in Italy and leading OEM treatment facility manufacturer IBA in Belgium.

*'JetDose will produce a novel monitoring system which addresses the growing need for in-vivo dosimetry in medical facilities across the world. This technology also shows good promise for application at other high intensity, high energy particle accelerators and this wider market will be assessed as part of the business plan that will be developed. The project marks an important step in the physics department's impact and industry engagement strategy.*

- Professor Carsten P Welsch, QUASAR Group Leader

## About us

The Quantum Systems and advanced Accelerator Research (QUASAR) Group is an internationally structured research group. We are amongst the world-leaders in beam instrumentations development, beam dynamics studies for accelerators and light sources. If you would like to find out more about our work on next generation particle accelerator diagnostics, please get in touch with Prof Carsten P Welsch: c.p.welsch@liverpool.ac.uk

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