**Calorimetry for Proton Beam Therapy**

Proton beam therapy is a more effective form of radiotherapy that provides  
significant benefits over conventional X-ray radiotherapy. Protons  
lose most of their energy in the last few millimetres of their path (Bragg Peak), enabling tumours to be targeted with greater precision and reducing the collateral damage to surrounding healthy tissue.

To ensure that treatment with such cutting-edge technique is delivered safely, a range of quality assurance (QA) procedures are carried out each day before treatment starts. Measurements to verify the Bragg Peak position at  
different energies are necessary and time-consuming.

A detector is currently under development at University College London  
to provide faster and more accurate proton range verifications, and speed up the daily QA process.

A calorimeter module that was developed for the SuperNEMO Neutrinoless Double Beta Decay experiment has been modified to record the depth-dose distribution of a proton therapy treatment beam. The new system utilises a multi-layer calorimeter to make direct measurements of the Water Equivalent Path Length (WEPL) with high resolution at clinical rates.

In this talk, the design of the Quality Assurance Range Calorimeter (QUARC) is presented.