

# GSI - SEMINAR

Im Theorieseminarraum, SB3 Raum 3.170a

Darmstadt, Planckstraße 1

Donnerstag, den 16. Apr 2015, 15:00 Uhr

**Dr. rer. nat. Uli Weber**

UNIVERSITÄTSKLINIKUM GIESSEN UND MARBURG

## **“Beam Modulation in Particle Therapy with Scanned Beams”**

The Bragg peak of heavy ion beams like carbon has an extremely sharp shape. Therefore, at particle therapy facilities with pencil beam scanning, the width of the Bragg peak has to be enlarged. This allows fewer energy steps from the accelerator to obtain homogeneous dose coverage of the planned target volume (PTV) and saves, therefore, treatment time by a factor of 3 or more.

The presentation includes an overview of the different effects and techniques that widen the energy spectra of the beam and therefore the width of the Bragg peaks. This concerns the energy loss straggling, the classic ridge filters resp. modulation wheels, ripple filters, porous materials and especially lung tissue. The principles of these different modulation effects/techniques will be described and set in relation to each other.

The presentation will give detailed information and results for a new and more effective ripple filter design. Furthermore, an alternative concept and measurements of the modulation in porous materials will be presented. In some cases porous materials can replace a ripple filter and improve the beam quality at the same time. Finally, the modulation of lung tissue will be presented. The new measurements at porcine lung show unexpectedly strong modulation effects. They lead to clinically relevant differences between the real dose distribution and the dose distribution displayed by state of art treatment planning systems.

Einladender: Gerhard Kraft

GSI Helmholtzzentrum für Schwerionenforschung GmbH