



Contribution ID: 857 Contribution code: THPL101

Type: **Poster Presentation**

## **Advancements in the scintillation fibre beam monitor for low-intensity ion beams at HIT**

*Thursday, 11 May 2023 16:30 (2 hours)*

The Heidelberg Ion-Beam Therapy Centre (HIT) provides proton, helium, and carbon-ion beams with different energies and intensities for cancer treatment and oxygen-ion beams for experiments. For several experiments and possible future applications, such as helium ion beam radiography, a low-intensity ion beam monitor integrated into the dose delivery feedback system for the accelerator control is a necessary pre-requisite. The updated 2D prototype for this purpose consists of scintillating fibres with enhanced radiation hardness, silicon photomultipliers (SiPMs) to amplify the emitted light, and a dedicated front-end readout system (FERS) to process and record the generated signals. This setup was tested successfully on monitoring ion-beam position and profile horizontally and vertically, as well as the beam intensity, for all four ion types with energies from 50 to 430 MeV/u and intensities from  $1E2$  to  $1E7$  ions/s. Additionally, time-of-arrival (ToA) measurements on single ions have been successfully performed for a limited intensity range, allowing for ion tracking in a further update. This will reduce noise, and will also improve the accuracy and usability of ion radiography.

### **Funding Agency**

Work funded by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), project number 426970603.

### **Footnotes**

### **I have read and accept the Privacy Policy Statement**

Yes

**Primary author:** HERMANN, Richard (Heidelberg Ionenstrahl-Therapie Centrum)

**Co-authors:** PETERS, Andreas (Heidelberg Ionenstrahl-Therapie Centrum); LEVERINGTON, Blake (Universitaet Heidelberg); HABERER, Thomas (Heidelberg Ionenstrahl-Therapie Centrum); GEHRKE, Tim (Deutsches Elektronen-Synchrotron)

**Presenter:** HERMANN, Richard (Heidelberg Ionenstrahl-Therapie Centrum)

**Session Classification:** Thursday Poster Session

**Track Classification:** MC6: Beam Instrumentation, Controls, Feedback and Operational Aspects: MC6.T03: Beam Diagnostics and Instrumentation