Contribution ID: **34** Type: **Talk**

PRIOR-II - Proton Radiography for FAIR

Monday, 27 January 2020 17:25 (25 minutes)

High energy proton radiography is a diagnostics technique suitable for many applications in the field of high energy physics, materials science and in the medical sector. The use of an imaging lens combined with a custom beam line configuration upstream of the experiment produces high quality images with the unique possibility of adjusting the image contrast according to the needs of the respective experiment.

A radiographic device — PRIOR-II — has been developed at the GSI Helmholtzzentrum für Schwerionenforschung GmbH Germany, specifically designed for fully exploiting the capabilities of the present SIS-18 synchrotron. The design of the setup is based on the experience acquired during the commissioning of the PRIOR-I prototype using permanent magnet quadrupoles {1,2}. PRIOR-II is expected to achieve a spatial resolution performance in the order of 10 microns with 4 GeV protons. Furthermore, it is possible to capture dynamic processes using the 0.3 Hz fast extraction mode of the synchrotron.

The setup is foreseen for transfer to the future FAIR facility, where the spatial resolution performance is expected to increase due to a slightly higher proton energy of 5 GeV. In addition, the temporal resolution capabilities will be enhanced due to the 0.1 Hz fast extraction mode from the SIS-100 synchrotron.

The magnets and power supplies are currently being manufactured, the FAT and installation is scheduled for January of 2020. In mid 2020 a beam time is scheduled which will include the static commissioning of the new setup as well as dynamic experiments with a newly developed pulsed power setup. Several further experiments regarding biomedical imaging for heavy ion tumor therapy as well as the propagation of shock waves in matter driven by high explosives are currently being prepared.

{1} D. Varentsov et al., "*Comissioning of the PRIOR proton microscope*", Rev. Sci. Instrum. **87**, 023303 1– 8 (2016).

{2} M. Schanz et al., „*High Energy Proton Induced Radiation Damage of Rare Earth Permanent Magnet Quadrupoles*", Rev. Sci. Instrum. **88**, 125103 (2017).

Primary author: Mr SCHANZ, Martin (GSI, Darmstadt)

Co-author: VARENTSOV, Dmitry (GSI, Darmstadt)

Presenter: Mr SCHANZ, Martin (GSI, Darmstadt)

Session Classification: Activities of HED@FAIR