Contribution ID: **50** Type: **Poster**

P06 - New Microbeam Slit System for High Beam Currents

Friday, 11 July 2014 13:00 (1 hour)

For ion microprobe materials analysis the brightness of the beam source is the most critical requirement in order to achieve best sensitivity with micrometer resolution and acceptable imaging time. We have installed a multicusp source [1] for negative hydrogen ions in order to optimize beam brightness at SNAKE and thus optimize also sensitivity and lateral resolution of 3D hydrogen microscopy by pp-scattering. As a result of beam transport simulations, we find that it is necessary to inject beam currents as high as 10 µA to meet the required phase space volume at SNAKE without a reduction of the transported beam brightness. This beam current means a thermal load of 250 W for 25 MeV protons mainly deposited at the microslits of SNAKE. Thus, our existing microslit system has to be replaced by a new, high power resisting, water cooled and temperature controlled microslit system.
Using finite element simulations we investigated the requirements for the new microslit system under maximum power input [2]. We use optimum heat conducting materials and a water cooling capable of up to P = 600 W heat dissipation [3]. The geometry of the water cooling is configured to avoid turbulence-induced pressure fluctuation and therefore parasitical vibrations, which would limit the achievable resolution. The slits are electrically preheated to keep constant temperature profiles and thus minimal changes in slit size. A very low uncertainty of the object size of < 1.7 µm and a position accurateness of < 0.3 µm is achievable [2]. The whole slits-system is electrically isolated to allow the tandem stabilization by using the current difference of the ion beam on the slits.

References:
[1] M. Moser, et al. High brilliance multicusp ion source for hydrogen microscopy at SNAKE. Nuclear Instruments and Methods in Physics Research B, 273:226 –230, 2012.
[2] T. Vallentin, Design und Simulation eines temperaturstabilisierten Schlitzsystems für den Transport eines hochbrillanten Protonen-Mikrostrahls, bachelor thesis, Universität der Bundeswehr München, Neubiberg, Germany, 2012.
[3] T. Vallentin, Planung des Aufbaus eines temperaturstabilisierten Schlitzsystems für den Transport eines hochbrillanten Protonen-Mikrostrahls, project thesis, Universität der Bundeswehr München, Neubiberg, Germany, 2013.

Primary authors: Mr MOSER, Marcus (Universitaet der Bundeswehr Muenchen, Germany); Mr VALLENTIN, Thomas (Universitaet der Bundeswehr Muenchen, Germany)

Co-authors: Prof. DOLLINGER, Günther (Universitaet der Bundeswehr Muenchen, Germany); Mr REICHART, Patrick (Universitaet der Bundeswehr Muenchen, Germany); Mr HARTUNG, Peter (Beschleunigerlabor MLL, 85478 Garching, Germany); Mr CARLI, Walter (Beschleunigerlabor MLL, 85478 Garching, Germany)

Presenter: Mr VALLENTIN, Thomas (Universitaet der Bundeswehr Muenchen, Germany)

Session Classification: Poster Session with Cheese and Wine