ION BEAM INTERACTIONS WITH A DENSE, LASER PRODUCED PLASMA

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The combination of intense heavy ion beams and a powerful laser makes the Gesellschaft für Schwerionenforschung (GSI) a unique place for the investigation of the interaction of swift heavy ions with dense plasmas ($n_e \approx 10^{21} e/cm^3$) [1]. After the upgrade of the *nhelix* laser the plasma group at GSI is in a position to heat up a target foil to a plasma of above 100 eV temperature by depositing more then 100 J in 13 ns on a spot of 1,5 mm diameter. This plasma serves as target to investigate the stopping and charge exchange processes of ions penetrating it. The plasma is diagnosed by a X-ray streak camera, laser interferometry, spectroscopic detectors and visible imaging to gain as much information as possible and use them as benchmarks for PIC simulations of the laser-plasma interaction.
We will report on energy loss measurements of Ar ions with an energy of 4 MeV/u interacting with a carbon plasma. The measured plasma properties will be compared with a PIC simulation, dealing for the calculation of the energy loss. Complementing experiments of charge state dependent stopping powers and charge exchange cross sections of Ar ions in solid carbon foils were done at the Hahn-Meitner-Institute in Berlin (analogical to [2]). Those data can be used to specify the main processes leading to an enhanced stopping in plasmas compared to solids.

1 M. Roth et al, Europhys. Lett. **50** (1), (2000) 28-34.

2 A. Blažević et al., Nucl. Instr. and Meth. in Phys. Res. B 190 (2002) 64-68.