

Bunch Compression in the Heavy Ion Sychrotron SIS at GSI, K. BLASCHE, O. BOINE-FRANKENHEIM, H. EICKHOFF, B. FRANZCAK, I. HOFMANN, K. KASPAR, R.W. MUELLER, P. SPILLER - Heating matter by heavy ion beams is a central aim of the plasma physics group at GSI. In order to maximize the energy deposition of the ion beam the total number of particles has to be captured in a single bunch with a pulse length as short as possible. In a first step adiabatic debunching of the four SIS bunches after acceleration followed by an adiabatic rebunching of the coasting beam on the first harmonic was successfully tested. This operation mode was applied at different ion species and at different levels of beam current. For further compression of the single bunch we consider as option further adiabatic compression using higher harmonics and fast bunch compression with a variable degree of prebunching. With respect to the required rf voltages a fast bunch compression with a 90 degree rotation promises to be the most effective. Within first machine experiments the effect of different prebunching amplitudes on the final bunch length was investigated and short bunches with a peak width of 100 ns were extracted. After commissioning of the new high current injector it is planned to increase the energy deposition in the target by making use of heaviest ions at intermediate charge states e.g. U²⁸⁺. To achieve the required 50 ns pulse length additional RF-cavities with a total voltage in the range of 100 kV or even more have to be installed. Results of computer simulations including the effects of higher harmonics, space charge and the cavity impedance are presented.