

FOCUSING OF INTENSE HEAVY ION BEAMS WITH PLASMA LENSES

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Abstract

Gabor lenses are a special type of plasma lens using a stable confined electron cloud for beam focusing. The electrons provide space charge neutralization of the beam traveling through the lens volume. At the same time a radial symmetric electrostatic self field focuses the beam mass independently. It is possible to control the density and distribution of the confined electrons providing variable focusing strength and moderate emittance growth of the beam. The knowledge of the behavior of the electron column inside this lens type is essential to understand the impact on beam transport. Therefore several diagnostic tools were developed to measure the electron cloud properties with and without ion beam propagation through Gabor lenses. Based on experimental results a new Gabor plasma lens has been designed for focusing heavy ion beams. A comparison of this lens type and a superconducting solenoid is planned at the low energy transport section of the GSI - High Current Test Injector (HOSTI).

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