Accelerator plans at GSI for plasma physics applications

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Abstract

The planned heavy ion synchrotron SIS100 will provide unique conditions for heavy ion plasma physics experiments at FAIR (Facility for Antiproton and Ion Research). However, the generation of compressed, highly-energetic beams with the desired intensity requires significant innovations in accelerator design and technology. The envisaged major increase in heavy ion beam intensity can only be achieved by accelerating ions with medium-charge state instead of the highly charged ions that are currently being used. Over the past 2 years, experiments on the heavy ion synchrotron SIS18 have shown the tremendous complication of this goal. The significantly shorter lifetime of the ions, together with the dynamic vacuum effect, requires new concepts for synchrotron design. In order to match the high-intensity beam to the plasma physics target, further major technical effort will be required in SIS100. A powerful low-frequency MA-loaded compression system is being designed for the generation of short, single bunches. Essential progress has been achieved within the framework of the SIS18 bunch compressor project in improving the material properties of the MA load.

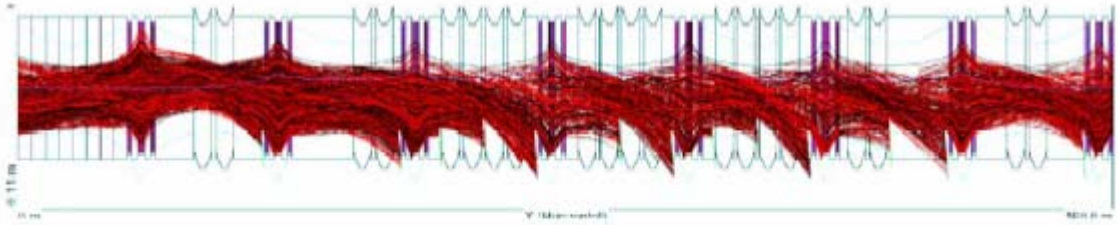

Fig. 3. SIS100 lattice structure as proposed in the CDR.

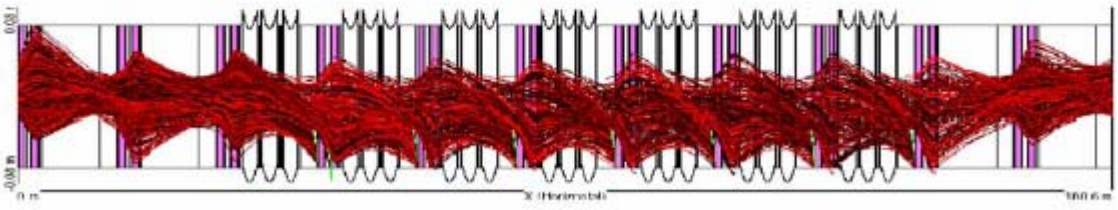

Fig. 4. SIS100 doublet structure with three dipoles per unit cell.