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# The Cryogenic Storage Ring CSR

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At MPIK the electrostatic cryogenic storage ring CSR is nearing completion. With 35 m circumference and beam energies of 20 keV to 300 keV per charge unit the CSR will allow experiments in a cryogenic environment with extremely good vacuum and low heat radiation. By using liquid helium at 2 K for cryopumping, a measured vacuum of 1 x 10E-13 mbar was proved (in a 3-m prototype device), ensuring long storage times for slow highly charged and singly charged ions, molecules and clusters. The internal quantum states of molecular and cluster ions can be cooled to low temperatures due to the low 10 K background radiation from the surrounding walls.

The cryogenic ion beam vacuum system of the CSR together with all ion optical elements is entirely housed in a cryostat. Extensive tests investigating the required thermal, vacuum and high-voltage parameters were successfully completed on one quadrant. The required temperatures of below 10 K for the cryogenic vacuum chambers and 2 K for the pumping units could be achieved in about 2 weeks. In addition the shifts of the ion beam orbit caused by deviations of the thermal shrinking from the corresponding theoretical predictions were measured, and are with less than 0.1mm within our specifications. Operation of the system at ±25 kV electrode voltages at the bending electrodes also was successfully tested.

Beam diagnostic elements which use induced pickup signals for beam-position, -profile and –current as well as detectors for neutral and charged fragments from interactions with the stored ions, the injection beam line, and an electron cooling device are either under construction or currently being tested. A large electrostatic platform (300 kV) has delivered first ion beams and will offer a versatile ion source area for supplying CSR ion beams.

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