The Cryogenic Storage Ring at MPIK

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The Cryogenic Storage Ring (CSR), presently undergoing commissioning (first stored beam on 17 March 2014) is a unique platform for experiments with cold stored heavy ion beams. It combines the advantages of traditional large-scale heavy-ion storage rings with those of compact electrostatic and cryogenic storage devices.

Mechanical Layout

Like an onion shell the electrodes in the cryogenic chambers are surrounded by 2 radiation shields, superinsulation with 30 layers and the outer cryostat. The inner electrodes are decoupled by bellows from the inner and the cryostat chambers.

Cryogenics

In 2011 and 2012 the completed first quadrant of the CSR was successfully cooled down two times to cryogenic temperatures and demonstrated the conceptual principles by achieving 2 K at the cryogenic pumping units and less than 10 K at the overall cryogenic vacuum chambers and ion optics elements.

Diagnostics section

The diagnostics section consists of Schottky, current and position pick up electrodes. The cryogenic chambers of the position pick up additionally houses self developed cryogenic pumps for room temperature operation.

Injection platform

For the source area a metallic cage with a proprietary high voltage platform was installed including the complete interlock safety system. A voltage up to 270 kV could be generated and with an optimized high voltage connector the 300 kV should be achievable.

First Beam

On March 17, 2014, the CSR has reached another important milestone. Already shortly after a first circle of an injected Ar+ beam, we succeeded keeping these ions on a stable track for many hundred circles. These tests confirm the highly precise implementation of the ion optics and the quality of its design based on theoretical models and calculations, despite the complete storage ring could not yet be cooled, and the storage time therefore couldn’t exceed some milliseconds.