

Poster

Design and Commissioning of a Cryogen-free $^3\text{He}/^4\text{He}$ Dilution Refrigerator for X-ray Spectroscopy at Storage Rings

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The precise determination of transition energies in highly-charged heavy ions in the X-ray regime provides a sensitive test of quantum electrodynamics. Such experiments are commonly performed at storage ring facilities. To improve performance a new semiautomatic cryostat was designed and installed in late 2012. It is equipped with a cryogen-free system that will help to accomplish more efficient beam times in the future. In order to bring the detectors close to the interaction region, the cryostat is equipped with a side arm with the detector mounted on a cold finger centered in the front of this side arm. Thereby it is crucial to know the exact position of the detector array for the data analysis. During the experiment the X-rays, originating from the interaction region, pass through several Mylar windows before they can be detected. Those windows separate the vacuum in the cryostat from the ultra high vacuum of the storage ring. Furthermore they provide a barrier for heat radiation from room temperature in order to maintain a minimum temperature of about 50 mK at the detector. The design and performance results will be presented with this poster.