

SiM-X: Silicon microcalorimeters for high-precision X-ray spectroscopy – Status and Perspectives

Monday, 19 September 2016 11:10 (20 minutes)

High-precision X-ray spectroscopy of highly-charged heavy ions is one of the established subjects within the program of SPARC. To improve the precision of such experiments, the detector concept of silicon microcalorimeters, which detect the temperature change of an absorber induced by an incoming photon, is now exploited.

Silicon microcalorimeters were successfully applied in several experiments at the ESR at GSI. However, for application at FAIR further improvements in detector design and performance are mandatory, namely

- larger detector solid angle
- combination of absorbers for high x-ray energies around 50–100 keV with absorbers for low x-ray energies around 5–10 keV
- improvement in readout electronics and data acquisition

A prototype detector system with a dry $^3\text{He}/^4\text{He}$ dilution refrigerator and an array of 32 detector pixels was installed at the ESR in the recent test beamtime in June 2016. The cryogenic system performed perfectly well. An energy resolution of around 150 eV at a X-ray energy of 30 keV was obtained, which allowed the observation of Lyman-alpha emission from hydrogen-like xenon ions with high precision. The contribution will present first results of the analysis from this test as well as perspectives for further improvements, in particular towards a detector with an increased solid angle and 100 detector pixels.

Collaboration

SiM-X

Primary author: KRAFT-BERMUTH, Saskia (GSI, Darmstadt)

Co-authors: BLEILE, Alexander (GSI, Darmstadt); ECHLER, Artur (GSI, Darmstadt); Prof. MCCAMMON, Dan (University of Madison, Wisconsin, USA); SCHOLZ, Pascal (Justus-Liebig-University Giessen); GRABITZ, Patrick (Johannes-Gutenberg-University Mainz); EGELHOF, Peter (GSI, Darmstadt); Dr ANDRIANOV, Victor (Lomonosov Moscow State University)

Presenter: KRAFT-BERMUTH, Saskia (GSI, Darmstadt)

Session Classification: SPARC Experiments