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Investigation of ion beam space charge compensation with a retarding potential analyzer at GSI accelerator facility

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During ongoing experiments at the GSI ion source test benches the space charge compensation of heavy ion beams was investigated. A retarding potential analyzer (RPA) was used to estimate the uncompensated beam potential. Measurements were done at a high current test bench with a multi cusp ion source (MUCIS) directly behind a triode extraction system to verify the functionality of the RPA system. With a variation of the grid mesh size within the device other experiments at the high current test injector HOSTI were performed. The measurements were done after a post acceleration system with ion energies up to 120 keV. Results from single aperture as well as multi aperture extraction systems are shown along the calculation of the space charge compensation and beam potential.

At HOSTI a Cold or HOt Reflex Discharge Ion Source (CHORDIS) was used to change the conditions for the measurements. All measurements were performed with Helium, Argon and Xenon and are exemplary presented.