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Operational tests of CRYRING@ESR without electron cooler solenoid compensation

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CRYRING@ESR is a low-energy heavy-ion storage ring recently recommissioned at GSI, Darmstadt, as part of the FAIR project. With its standard working point lying on the lowest-order difference resonance, the ring contains a compensation solenoid to counter coupling of betatron motion introduced by the electron cooler magnetic field. That solenoid largely occupies one of the drift sections of CRYRING, which would otherwise be available for additional experimental inserts. We performed a series of machine experiments to gain better understanding of the performance of the compensation solenoid and its importance for successful operation of the ring, especially with regard to damping rates and final emittances reached by electron cooling. Our measurements show that omission of the compensation solenoid does not lead to a notable deterioration of beam intensity, lifetime or quality. However, we could clearly observe the resulting betatron coupling in the cooled ion beam and its predicted impact on the tunes of the ring, effects that are cancelled surprisingly well with the compensation solenoid enabled, and that may be of importance for some experimental schemes. Our results can serve as basis for a discussion about a possible future removal of the compensation solenoid.

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Footnotes

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