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## Cryogenic Current Comparator (CCC): absolute beam current measurement in the order of nA

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The Cryogenic Current Comparator (CCC) is able to provide a calibrated non-destructive measurement of beam currents with a resolution of 10 nA or better. The non-interceptive, absolute intensity measurement of weak ion beams ( $< 1 \mu\text{A}$ ) is essential in heavy ion storage rings and in transfer lines, as the ones in FAIR. With standard diagnostics, this measurement is challenging for bunched beams and virtually impossible for coasting beams. The CCC provides reliable values for beam currents of this order of magnitude or lower, independent of ion species and without tedious calibration procedure.

The test in the heavy-ion storage ring CRYRING@ESR at GSI has confirmed its viability, and has also suggested several improvements to the detector hardware. Therefore, an upgrade of the CCC system was performed and tested in laboratory environment. A review of these improvements will be presented herein, with a detailed discussion of the most important measures and the next development steps for the final version of the CCC for FAIR.

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