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Status of the Isolde RFQ Beam Cooler

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The Isolde RFQ beam-cooler[1][2][3] is now an indispensable part of the operation of the Isolde facility, providing greatly improved beam quality via reduced transverse emittance. It also has an optional function to trap ions longitudinally, delivering bunched beams to experiments which need them.

During the 2013 CERN shutdown the cooler was largely rebuilt, partly to address reliability issues, but also to correct misalignments in the injection and extraction regions. It is now possible to inject laser beams into the newly recommissioned cooler, and optical pumping of strontium-88 has been demonstrated. 422 nm light from the Isolde RILIS[4] lasers was sent into the trapping region of the cooler where ion bunches were held for 50-1000 ms, populating a metastable level. The metastable state has an enhanced neutralisation cross-section with sodium vapour, which was read out via the charge-exchange cell in the COLLAPS experiment[5]. We estimate that the population of the metastable state was approximately 50%. This demonstration paves the way to further experiments using optically-pumped ion beams[6].

We will also discuss the bunching performance of the RFQ and the effect of alternative tunes.

References:

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