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Upgrade of the Radio Frequency Quadrupole Cooler and Buncher for the HIE-ISOLDE Project

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The ISCOOL RFQCB (radio frequency quadrupole cooler and buncher) at the
CERN facility ISOLDE is used to reduce the emittance and energy spread of the beam, and to give it a time structure before it is sent to the experiments [1]. The upgrade to ISOLDE, HIE-ISOLDE, will encompass many aspects, including an upgrade to the high resolution separator area that will see the ISCOOL design improved and the machine moved to a position between the ion source and the separator magnets. This will
improve beam quality by increasing the resolving power of the HRS magnets.
The focus of the ISCOOL upgrade will be on fixing the problems of alignment with the current machine, improving the integrity of the vacuum just outside the ISCOOL chamber, stabilizing the gas pressure inside the chamber, modifications to the extraction and injection electrodes to facilitate direct matching to the other beamline
components, and the changes associated with the new position. To accomplish these goals, a test stand will be created, which will be used to test various components of the design study, including the ISCOOL currently in use at ISOLDE.
Preparation for the construction of the test stand will involve the physical construction of the new RFQCB, which should be finished by January 2013, simulation to determine the exact optical properties and tolerances of the current design and consideration of all the changes required when moving ISCOOL to a new location; this step is necessary because of possible space restrictions, the higher beam intensities, the
compatibility with other beamline components, and a much more radioactive environment. This study will result in a more reliable, more efficient RFQCB. Its better optical properties will lead to an increase in the quality of the ISOLDE beam.

[1] A. Jokinen et al., Nucl. Instr. and Meth. in Phys. Res. B 204 (2003) 86-89

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