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Integration of RFQ Beam Coolers and Solenoidal Magnetic Field Traps

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Electromagnetic traps are a flexible and powerful method of controlling particle beams, possibly of exotic nuclei, with cooling (of energy spread and transverse oscillations) provided by collisions with light gases as in the Radio Frequency Quadrupole Cooler (RFQC) or with charged particles (as in electron coolers or charge breeder trapping). In particular in the context of the Coolbeam project, a prototype of an RFQC is being built, and two test beamlines are being considered. Both beamlines are based on a alkali metals surface ionization source, followed by a low energy transport at about 5 keV, deceleration into RFQC to energy E_b , and reacceleration towards an emittance meter. One beamline is planned to be placed with a suitable adapter inside the existing Eltrap solenoid, capable of providing a magnetic flux density component B_z up to 0.2 T, where z is the solenoid axis. Confinement in the transverse plane is provided both by B_z and the rf voltage V_{rf} (up to 1 kV at few MHz). Transport is provided by a static electric field E_z (order of 100 V/m), while gas collisions (say He at 1 Pa, to be maintained by differential pumping) provide cooling or heating depending from V_{rf}. So the major parameters E_b, E_z, V_{rf} (and possibly B_z) must be optimized for maximizing beam transmission (at a cooling rate adequate for SPES project needs), both by experiments and by numerical simulations, as it is summarized. A status of installation progress is here reported, including commissioning of the emittance meter and of several insulators and feedthroughs needed.