Contribution ID: **13** Type: **Poster**

Commissioning status of a combined RFQ Cooler with axial magnetic field in the Eltrap machine

Thursday, 11 September 2025 11:15 (1h 45m)

In nuclear physics accelerators, as the SPES (Selective Production of Exotic Species) complex at LNL, radiofrequency quadrupole coolers (RFQC) are often necessary to cool the beam from exotic ion sources both in energy spread σ_E and normalized transverse emittance ϵ_N, in order to match the acceptance of high resolution mass spectrometers for exotic nuclei selection (rms roughly $\sigma_E = 0.5$ eV and $\epsilon_N < 3$ nm). Since cooling is due to ion-gas collisions with collision energy in the order of 10 eV, the ion beam energy ($K_s = 40$ keV in SPES) has to be reduced before RFQC iniection. Beam transport inside RFQC may be facilitated by an axial magnetic field as in Eltrap machine, where an RFQC prototype is now installed and being commissioned; in principle the RFQC extraction behaves as a virtual ion source, with a challenging beam optics; results from several computational codes are reported. In Eltrap RFQC, we limit $K_s \leq 5$ keV and ion kind to Cs^{1+}, to use a commercial ion source (installed on a suitable voltage platform) as injector. Beam diagnostics include a Faraday cup FC1 before RFQC injection, and, after extraction, another Faraday cup FC2 and a pepperpot emittance meter EMI1 (also on a suitable platform). Commissioning status is reported, including the elaborate final wiring of RFQC electrodes and the differential pumping system, the tuning of extraction optic and the communication between different hardware, especially with EMI1. Beam dynamics and energy analysis capabilities of FC2 (and/or its necessary updates to an energy spread analizer) are discussed.

Primary author: CAVENAGO, marco (INFN-LNL div. Acceleratori)

Co-authors: Mr BORIA, Enea (Dip. Fisica, Univ. Milano e INFN-MI); Dr CAVALIERE, Francesco (Dip. Fisica, Univ. Milano e INFN-MI); Dr COMUNIAN, Michele (INFN-LNL div. Acceleratori); Prof. MAERO, Giancarlo (Dip. Fisica, Univ. Milano e INFN-MI); Dr MAGGIORE, Mario (Dip. Fisica, Univ. Milano e INFN-MI); Prof. ROMÈ, Massimiliano (Dip. Fisica, Univ. Milano e INFN-MI); Dr RUZZON, Alberto (INFN-LNL div. Acceleratori); GALATÀ, Alessio (INFN-Legnaro National Laboratories)

Presenter: GALATÀ, Alessio (INFN-Legnaro National Laboratories)

Session Classification: Poster Session

Track Classification: Beam formation, extraction, and transport