Heavy-ion guide RFQ System

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To capture radioactive species after the heavy-ion guide gas catcher and direct them to the different devices, a complex RFQ system has been designed. The RFQ system consists of

- A 30 cm long DC-drag cooling RFQ (Fig. 1) located immediately after the gas catcher's exit hole at a relatively high gas pressure zone caused by the flow of helium gas from the gas catcher.

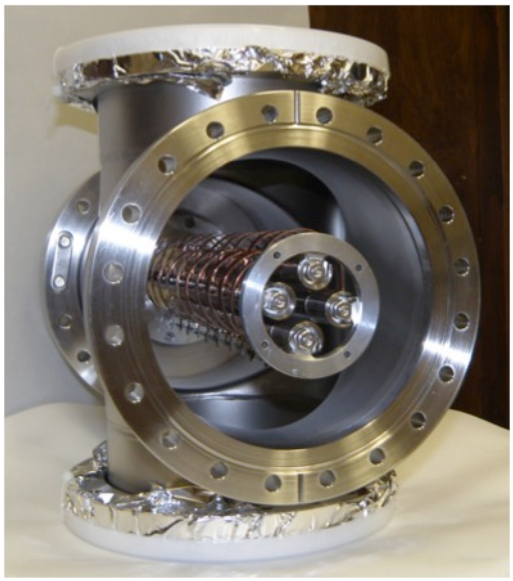

FIG. 1. The 30 cm long DC-drag cooling RFQ assembly.

- At the end of the DC-drag cooling RFQ, a micro-RFQ is mounted (Fig. 2). The micro-RFQ is 2 cm long and has a 4.5 mm exit hole, which is necessary to ensure efficient differential pumping

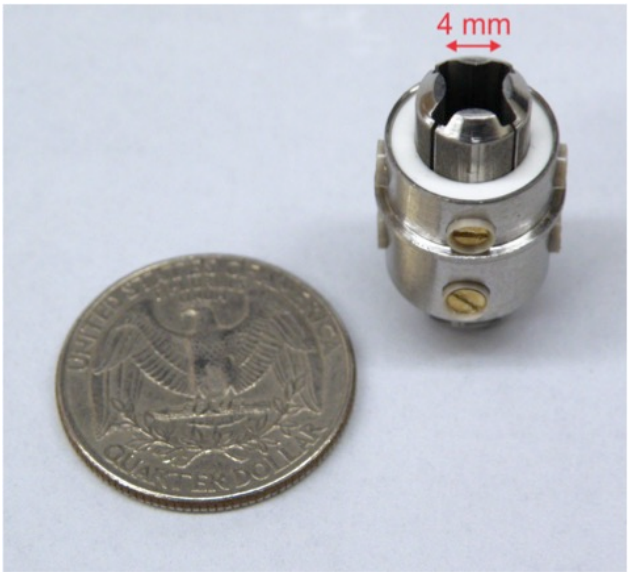

FIG. 2. The micro-RFQ after the DC-drag cooling RFQ.

The Micro-RFQ can be coupled individually with three other DC-drag RFQs (branching system Fig. 3), which are mounted inside the large vacuum chamber on a remotely controlled position system. Two curved RFQs deliver radioactive ions to either the CB-ECR ion source injection line (in the horizontal plane) or vertically to the TAMU Trap's beam line. Additionally, there is a third straight section RFQ that leads to the Ortho-TOF mass spectrometer and a fourth 90 degree port that points directly to the CB-ECR ion source for tuning the injection line with 1+ alkali ion sources. The four branching RFQ sections have different lengths ranging from 45 cm to 63 cm.

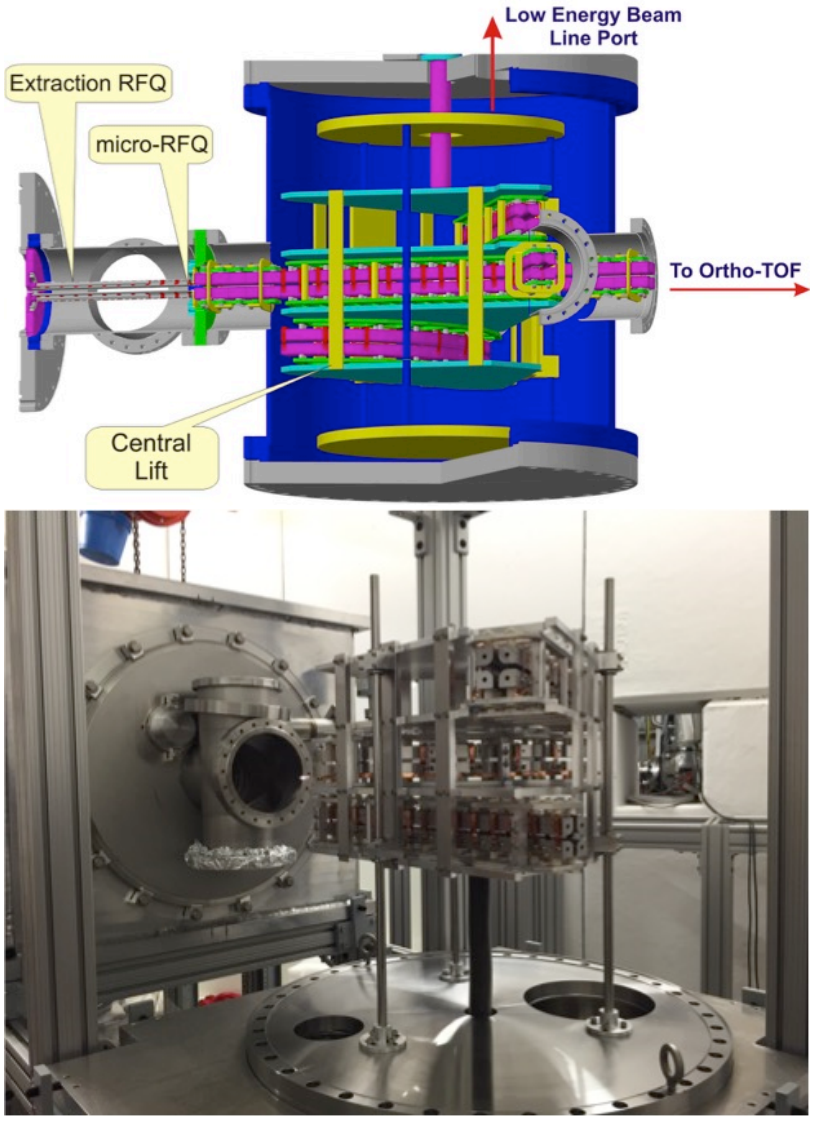

FIG. 3. The Branching-RFQ system.

Depending on the mass of the ion, RFQs can operate in a range of frequencies from 600 to 1500 kHz. They were individually tested and based on preliminary results transport efficiency is in the range of high 90 percentile.