Texas A&M cyclotron K150 broad beams for foil irradiation

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The Broad Beam project aims to deliver a uniform, narrow, 35 cm wide beam spot to customers who will contract beam time on the K150 Cyclotron for the production of ultrafine filters. The broad beams will be produced electromagnetically by setting the final quadrupole magnet to defocus in one plane thus allowing the beam to grow to 35 cm as it drifts down the beamline (Fig. 1). Existing hardware has been used where possible to speed up construction and reduce cost.

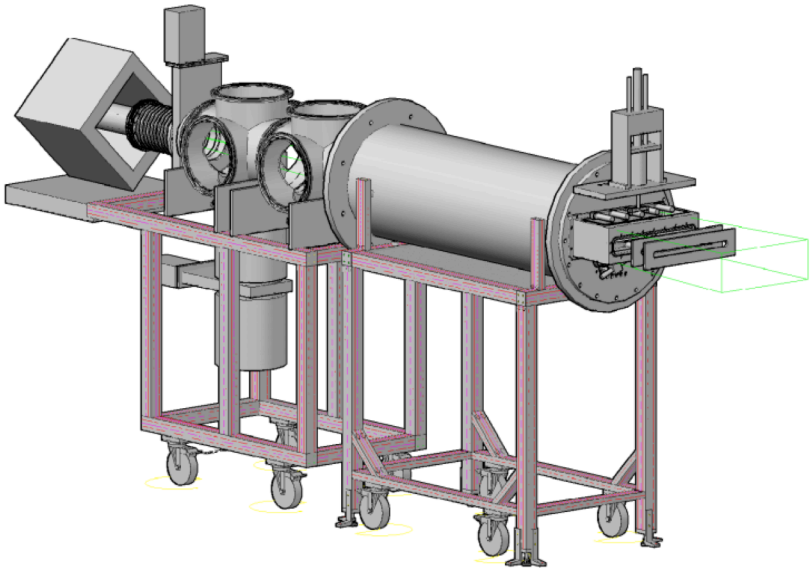

FIG. 1. Simplified beamline after the defocusing quadrupole magnet.

The most recently completed part, the "duckbill" (Fig. 2), completes the outer mechanical structure of the beamline. However, mounting assemblies are still being made for the scintillator detectors and filter foil samples. The duckbill provides the beam window for in-air delivery of the beam and housing for detectors used to monitor the beam in vacuum. Existing scintillators from SEELine will be used as the detectors, which will be monitored and logged by a system of National Instruments PCI/PCIe cards, NIM units, and other electronics. This experiment will serve as an evaluation for the use of similar cost-saving electronics in other applications. Equipment such as vacuum pumps, cabling, and NIM electronics is shared with the SEELine proton irradiation setup in the 88" Vault. A minimal-setup test run in December 2014 demonstrated the expected beam profile, but issues with the electronics prevented an exact measurement of beam uniformity. A test run is expected in the summer of 2015.

FIG. 2. Duckbill, detector mounting plate, two interchangeable beam windows, beam window transition plate and Duckbill mounting flange with feedthrough holes.