Introduction
The Texas A&M University Penning Trap (TAMUTRAP) facility (Figure 1) will conduct precision measurements on beta-delayed proton decays to probe physics beyond the standard model. The Texas A&M University Reaccelerated Exotics (T-REX) upgrade project will deliver a low energy radioactive beam to the TAMUTRAP facility for measurement. Along the beam path through the TAMUTRAP facility there are three 90° deflections where electrostatic deflectors will be placed. The overall goal of this project was to test and analyze the cylindrical deflector as a suitable beam transport method for the TAMUTRAP facility.

The Cylindrical Deflector
The cylindrical deflector (Figure 2) was analyzed and tested for the TAMUTRAP facility for its simpler design compared to other deflectors. The draw back of the cylindrical deflector is the field potential lines it produces in the transport region are less consistent (Figure 3). The main goal of this analysis was to observe the effects of the cylindrical deflector on a symmetric beam profile to observe the deflectors suitability for use in the TAMUTRAP facility.

Obtaining The Optimum Ion Beam
Previous attempts at fabricating a suitable beam were met with many complications which can be seen in figure 5.1. The beam spot produced by the ³⁷K ion source was several centimeters in diameter and did not simulate the beam the TAMUTRAP facility would be receiving. To compensate for the large non-symmetric beam produced a collimator was added to the beam line after the ion source. With the collimator the beam gained circular shape and the diameter was greatly reduced. Along the path of the beam to the cylindrical deflector there are several correction optics (Figure 4) which had to be calibrated. The system of correction optics produced a symmetric beam spot (Figure 5.2).

Results
After the deflector was placed in the beam line several images were taken of the beam profile at different deflector plate voltages. The images were then imported into Mathematica and analyzed for their brightness values vs. position values. Then a Gaussian was fitted in red (Figure 6). From the Gaussian fits, beam properties such as position and width in the X and Y directions were easily extracted. A graph of the outer plate voltage vs. the corresponding inner plate voltage shows a linearity in deflector plate voltages used to keep the beam in the same area (Figure 7.1). The X and Y widths of several plate voltages were then plotted with their respective outer plate voltage (Figure 7.2). In Figure 7.2 it was observed that the deflector produced a symmetric beam output within a reasonable voltage range. The analysis was done for several lens voltages with the best results being between 5700V-6000V.

Conclusion
The main goals of the project were achieved and a symmetric region for the cylindrical deflector was found (Figure 8). The difference in the positions of the beam before the deflector and after the deflector were due to lack of precision alignment. The cylindrical deflector was found to be an effective method of beam deflection for TAMUTRAP and will be utilized in the future. An emittance station was assembled and will be utilized for future study of the beam properties.