

## Abstract

A new beamline with a general-purpose scattering chamber was constructed at the SUNY Geneseo 1.7 MV Pelletron accelerator laboratory. The beamline is equipped with a general-purpose 28 inch scattering chamber which includes a target manipulator system, faraday cup, and a mounting for a surface barrier detector.

#### Motivation

The new beamline will be used for a wide variety of experiments:

- •Calibration of a Thomson Parabola
- •General Rutherford scattering
- •Calibration of radiochromic film
- •Experiments involving carbon ion beams
- •Experiments requiring the utilization of the large chamber



Accelerator prior to installation



New Beamline

Sighting through steering magnet



The new line in operation



Completed new line



Aligning quadrupole magnets



NEC 1.5MV Tandem Pelletron Accelerator (5SDH)

# Construction of a New Beamline at the SUNY Geneseo Pelletron Accelerator for Calibrating a Thomson Parabola

Megan Crossman, Steven Hupcher, Charlie Freeman, Stephen Padalino: SUNY Geneseo Christian Stoeckl: Laboratory For Laser Energetics

Scattering Chamber





Twenty-eight inch scattering chamber



Target manipulator and surface barrier detector in chamber



Magnetically coupled target manipulator



Target manipulator with gold foils for Rutherford scattering experiment





Use of Thomson Parabola on MTW for measuring high energy protons.

Radiochromic Film

Gafchromic (HD-810) Radiochromic film (RCF), normally used in medical dosimetry, was placed in the new scattering chamber in an effort to create proton dose calibrations.

Au Foil

Schematic of RCF scattering experiment



RCF upon immediate removal

Irradiated RCF with estimated angles of incidence

### Thomson Parabola





Assembling the Thomson Parabola



The chamber of the Multiterawatt Laser



3D CAD drawing of the Thomson Parabola on MTW

The new beamline will be used for experiments with Radiochromic and CR-39 film as well as experiments with carbon ion beams. The Laboratory for Laser Energetics at the University of Rochester hopes to use SUNY Geneseo's data from the low energy proton Thomson Parabola calibrations upon the installation of the Thomson Parabola at Multiterawatt Laser Facility.



#### Rutherford Scattering Experiment



Plot of the color density as a function of the inverse  $\sin^4(\theta/2)$ . Color density should be proportional to radiation dose so the plot should be linear based on Rutherford's scattering equation.



calibration on the new beamline at SUNY Geneseo

### **Future Plans**