

# Development of the Scintillating Fiber Detector in AEGIS

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- AEgIS - Antihydrogen Experiment: Gravity, Interferometry, Spectroscopy
- AEgIS will measure the gravitational acceleration of antihydrogen
  - the first measurement of gravity in antimatter
- Will also make spectroscopy measurements

# AEgIS Overview

- 1 AEGIS traps antiprotons from the Antiproton Decelerator
- 2 Positrons are created using a Na-22 source and converted into Positronium
- 3 Positronium and antiprotons are combined into antihydrogen
- 4 The atoms are accelerated towards a deflectometer
- 5 The distortions in the deflection pattern are measured to find gravitational acceleration

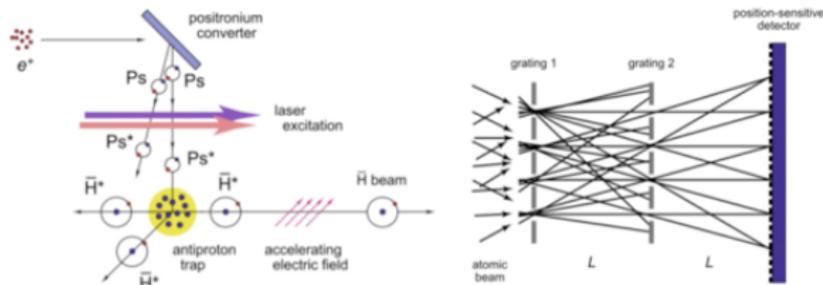


Figure : An overview of the AEGIS experiment

# My Work

- Work on shift for the antiproton beam
- Made an apparatus for light transmission tests
- Made a control program for a digitizer
- worked on the setup for polishing the ends of the fibers for the detector



# Scintillating Fiber Detector

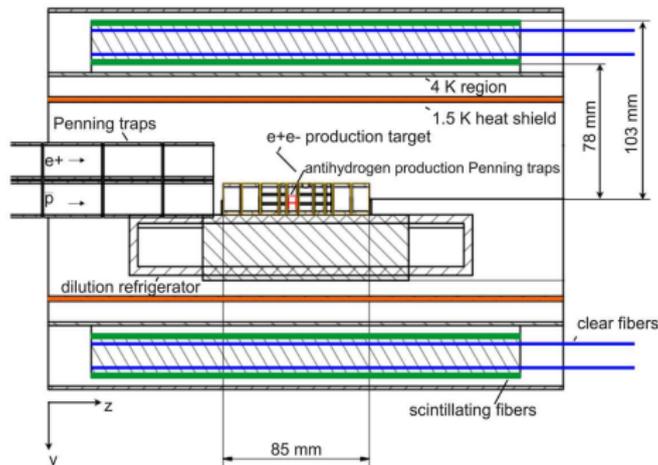
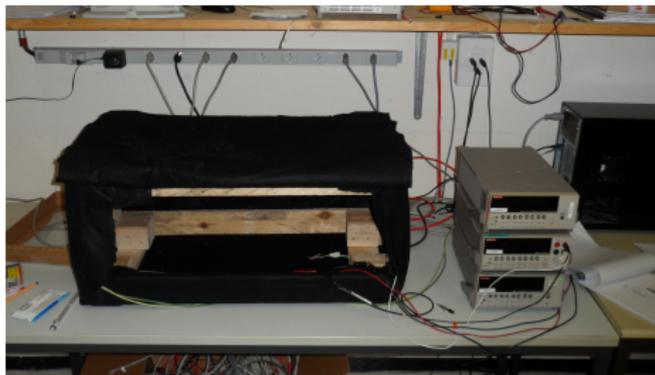


Figure : The antihydrogen trap surrounded by the scintillating fiber detector

- The detector is formed by rings of scintillating fiber
- It can be used for an idea of temperature, time of flight, and location in the trap of the antihydrogen

# Transmission Tests



- Version one of the transmission test apparatus
- Used to test the transmission efficiency of fiber optic connections and the quality of the fiber polishing.
- Shines light into one end and reads the light output on the other end.

# Transmission Test V2

- Version shown on last slide had problems with consistency
- Uses a plastic frame to achieve reliable connections
- Applies light from the side, reading out light on each side
  - Allows normalization and easy calculations of transmission efficiency without relying on correlations between multiple tests

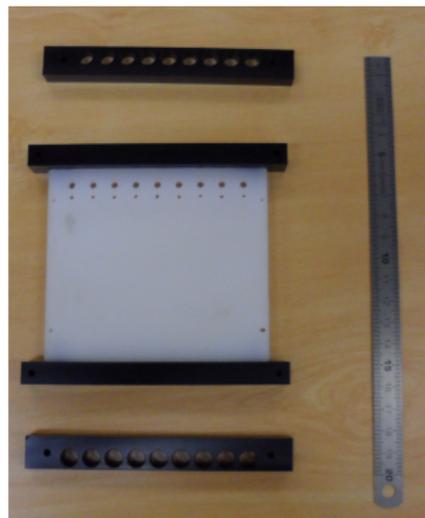


Figure : The frame to hold the connections for the transmission test.

# Digitizer

- Reads the output of several photomultiplier tubes for determining proper thresholds and the characteristics of the signal
- Programmed in C using vendor provided libraries



Figure : The digitizer being programmed is circled in blue

# Fiber Polishing

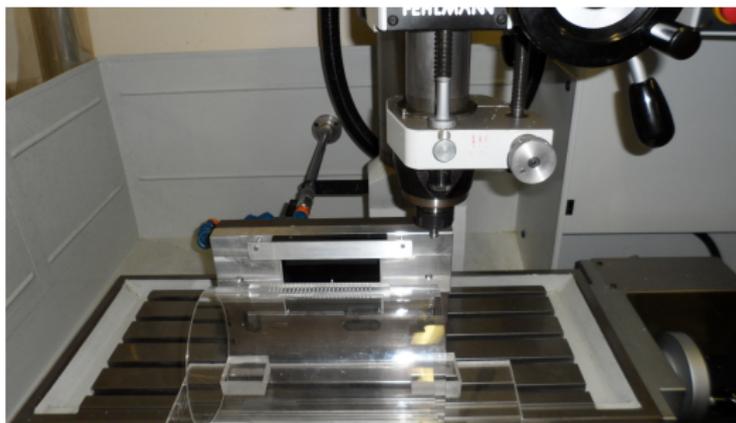
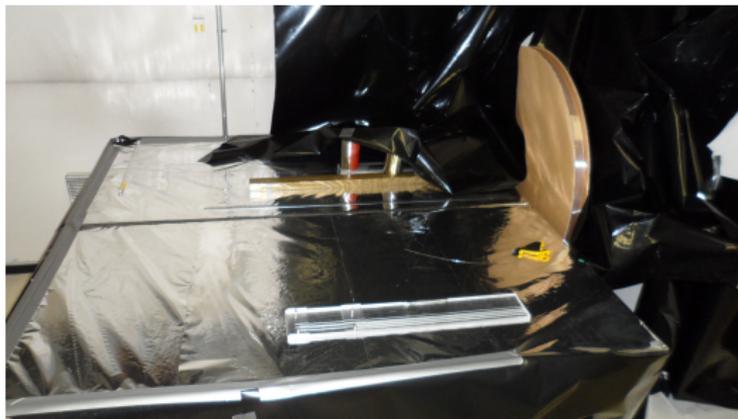


Figure : The setup used for polishing fibers

- Using a diamond cutting bit to cut the fiber smooth and flat(polishing)
- Shown is the jig for holding the fiber in the polishing process

## Fiber Polishing Cont.



- Spent time cleaning a room and setting up a clean workspace for working with the fiber



# Next Steps

- Polish fibers
- Mirror the end of the fibers
- Determine the efficiency of the fiber connections and using this to optimize the connections in the detector

# Questions?

## References

- AEgIS proposal
- M.Doser, C. Amsler, C. Canali, L. Joergensen, M. Kimura, C. Regenfus, J. Rochet, J. Storey, "Test of the Equivalence Principle with Antihydrogen"