Mission Statement

Our mission is to measure atmospheric muon flux, the intensity of different visible light wavelengths with a Hamamatsu spectrometer through an optical port, and the mitigation of gamma and beta radiation with different types of plastics (ABS, PLA, and Hemp). Furthermore, our mission also promotes and advances student’s interest in Science, Technology, Engineering, and Mathematics (STEM) at the local middle school in Geneva, New York. The Geiger Müllers on board were built by students at Geneva Middle School.

Expected Results

- Linear decrease in muon flux with increased altitude and little to no muon flux in space.
- Muon flux of approximately 1 muon/cm²· s at sea level.
- Blue-shift (shortening of wavelengths) and Red-shift (stretching of wavelengths) in spectral data.
- Spectral absorption peaks corresponding to the sun spectrum and different composition within the various layers of the atmosphere.
- Hemp, ABS, and PLA plastics will provide different levels of shielding.

Payload Overview

On the top level of the canister, four Geiger Müller counters are placed and attached to plastic rectangular plates in a quadrilateral in order to utilize space in the most efficient manner. This allows our team to measure four different variables. On the bottom level is the spectrometer and the muon detector.

Background

Muons are elementary subatomic particles which are of particular interest. Muons are generated when cosmic rays interact with Earth’s atmosphere. They have the same charge and spin as an electron, but are 207 times as massive. Data on muon flux at Earth’s surface is readily available, but little to no data exists on the muon flux near the fringes of Earth’s atmosphere and in space.

Mission Overview

We are interested in muon flux in the Earth’s upper atmosphere since little data exists in this area. We are also interested in spectral analysis of the various layers of the Earth’s atmosphere to determine pollutant components and greenhouse gases. Our payload also allows us to determine radiation shielding characteristics of a variety of plastics.

Acknowledgements

We would like to give a special thanks to our advisors, Peter Spacher Ph.D., and Ileana Dumitru, Ph.D. for their outstanding commitment and devotion to helping us accomplish our goals. We would like to also thank the HWS President’s Fund for funding this endeavor.