



Balloon-Borne Scanning Solid State Cosmic Ray Spectrometer (SCS) with Mass Identification

Natalie Ramm

Taylor University, Upland, IN

Hank Voss and Jeff Dailey, Faculty Advisors

Taylor University, Upland, IN

Using three solid state detectors, particle coincidence can be observed. The purpose of this project was to design and build a detector, using the three solid state detectors, which can scan an area and identify direction, energy, and mass of a charged particle. This coincidence detector was flown and tested on a high altitude balloon and will be implemented in TSAT, the satellite designed at Taylor University which was awarded the launch on a NASA rocket in 2013-2014. A coincidence detector would be very useful on a larger satellite project with more instrumentation to help identify instrument interference in the presence of charged particles in the atmosphere.

A detector using copper piping, 3 solid state detectors stacked on top of each other, and lead shielding was designed and built to be the means of this exploration, (SCS). Using a servo, the detector will be able to scan a wide area for particle coincidence. A magnetometer will also be attached to the top of the detector to know the orientation of the detector window. For the high altitude balloon test, the detector was in a protective canister. The canister was sectioned where the detector was sealed off from its electronics as to get the solid state detectors (SSD) as cold as they can be. The copper design of the SCS was ideal for thermal conductivity which will be taken advantage of while going through the Jetstream to cool the SSD.