Project Title:
Development and Testing of a New Angle Detecting Inclined Sensor (ADIS) System

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Project Information:
The Living With a Star (LWS) program is directed towards better understanding the near-Earth environment. The proposed research has, as its main goal, an improved technology to build inexpensive, low-power, low-weight instruments that can measure the charged particle environment. We propose to proof-test a new system, an Angle Detecting Inclined Sensors (ADIS) System, which can determine the angle of incidence of charged particles in space based instruments. We propose to develop and test an ADIS system using solid state silicon detectors in order to show the feasibility and practicality of using such a system. ADIS could have applications in measurements of Solar energetic charged particles as well as anomalous component ions and Galactic cosmic rays. Our proposed system should be able to identify electrons and to separate charged particle isotopes from hydrogen through neon and elements through nickel. Systems presently used as position sensing detectors (PSD's), such as solid state strip detectors or optical fibers, require significant power to operate and often add weight to an instrument, either directly or through the added electronics. Passive systems, such as curved detectors, have relatively poor isotopic resolution and cannot make measurements at the lowest energies. Our ADIS system addresses these limitations. An ADIS system determines the angle of incidence of a charged particle based only upon energy deposits in detectors which are inclined with respect to each other. These same energy deposits are used as part of the dE/dx measurements used in a dE/dx vs E method of particle determination. Because a single set of measurements is used both for the determination of the angle of incidence and for the dE/dx measurement, no extra electronics are needed, so an instrument with an ADIS system can meet both weight and power constraints usually required in space instruments. Anisotropy measurements are also available since ADIS determines particle trajectories. The simplicity of the ADIS system should decrease the cost to build a space based charged particle instrument. It should be noted that a nearly identical proposal was submitted to the Solar and Heliospheric Science (A.2) program. The proposed research is fully appropriate to both programs.

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