Project Title: The role of turbulence in particle acceleration in the solar wind

Project Reference Code: Adhikari-UAH

Name of Project Leader: Laxman Adhikari

Host Facility: University of Alabama in Huntsville

Internship Location: Cramer Research Hall

Host Facility Location: 301 Sparkman Drive, Huntsville, AL, 35899

Project Description (roughly 300 words):
Understanding the acceleration and transport of solar energetic particles (SEPs) in the heliosphere and the interstellar medium remains an important open problem in space physics and astrophysics. Turbulence is believed to play a fundamental role in the generation of nonthermal ion populations in turbulent plasmas and in the acceleration and modulation of energetic particles in the solar wind. In particular, numerous studies have suggested that compressible turbulence contributes to energetic particle acceleration and modulation. In this project, we will use plasma and magnetic field measurements from the WIND spacecraft to estimate the turbulence injection rate and investigate how variations in this rate influence energetic particle modulation in the solar wind.

Disciplines: Physics, Math, Computer Science

Importance:
Understanding the acceleration of solar energetic particles in the solar wind is one of the important problems in space physics. This study will help clarify the role of turbulence in the energization of energetic particles in the heliosphere.

Requirements:

- Preferred Major
  - Physics, Math or Computer Science
- Class work
  - Physics, Math or Computer Science
- Programming knowledge
  - Python or Matlab
- Software knowledge
  - NA
- Other

Biography (roughly 100-150 words):
The project leader's name is Dr. Laxman Adhikari. Dr. Adhikari is an Assistant Professor in the Department of Space Science at the University of Alabama in Huntsville. Dr. Laxman Adhikari has over 8 years of experience in heliospheric space plasma research, specializing in magnetohydrodynamic (MHD) turbulence transport modeling and analyzing the spacecraft data sets. He has compared his turbulence-driven solar wind model results with Parker Solar Probe (PSP), Solar Orbiter (SolO), Helios 2, Ulysses,

Voyager 2, WIND, ACE, Cassini, Pioneer 10, and New Horizons Solar Wind Around Pluto (NH SWAP) measurements.

Is U.S. citizenship required to participate in this project? No

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