Goddard Space Flight Center 2009 Sample Student Projects

Required Academic Level

Graduate/Masters,
Graduate/Doctorate

Category

Engineering

Subcategory

Mechanical

Project Title

Design & Characterization of Modulation Grids for Fourier-Transform X-ray Imaging

Project Description

Student will assist with the design and characterization of X-ray modulation grids for use in Fourier-transform X-ray imaging systems. The grids are being proposed for future space missions to obtain images of solar flares in X-rays and gamma-rays as follow-ons the the RHESSI observations made since its launch in 2002. Tungsten grids with slits as narrow as 10 microns can now be fabricated for use in X-ray imagers with the arcsecond angular resolution that is needed to resolve the detailed features of solar flares. The student will work with the existing optical and X-ray grid characterization facilities in the Solar Physics Laboratory to evaluate various grids that have already been fabricated. In addition, he/she will participate in the design of grids for X-ray imagers on the Solar Orbiter and Solar Probe+, for a balloon-borne gamma-ray imager/polarimeter, and for other future opportunities that may arise.

Mentor's Expectation of Student

The student will be expected to become proficient at using the existing optical grid measuring device in Solar Physics Laboratory. He/she will characterize already fabricated copper and tungsten grids to verify that they meet the design specifications at the micron level. Further work with resident solar physicists will include designing grids for future X-ray and gamma-ray devices using various forms of Fourier-transform imaging approrpiate for the circumstances of the particular opportunities.

Discipline of Project and/or Background Needed to successfuly complete the project

Astrophysics; Engnr: Control Systems, Mechanical, Optical

Skills

Analysis, Research, Clean Room Experience, Data Acquisition, Optics, Control Systems, Windows, Excel, IDL