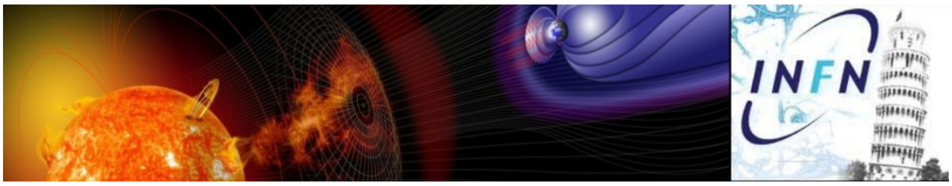
RHESSI-20 Workshop: Preparing for the Next Decade in High-Energy Solar Physics Research



Contribution ID: **58** Type: **not specified**

Magnetic Field Measurements of a Twisted Flux Rope in a Partial Solar Eruption

Thursday, 8 July 2021 17:21 (4 minutes)

Magnetic flux ropes are the centerpiece of solar eruptions. Direct measurements for the magnetic field of flux ropes are crucial for understanding the triggering and energy release processes, yet they remain heretofore elusive. Here we report microwave imaging spectroscopy observations of an M1.4-class solar flare occurred on 2017 September 6, using data obtained by the Expanded Owens Valley Solar Array. This flare event is associated with a partial eruption of a twisted filament observed in Hα by the Goode Solar Telescope at the Big Bear Solar Observatory. The filament, initially located along the magnetic polarity inversion line prior to the event, undergoes a partial eruption during the course of the flare. This partially erupting filament has a counterpart in microwaves, whose spectral properties indicate gyrosynchrotron radiation from flare-accelerated nonthermal electrons. Using spatially resolved microwave spectral analysis, we derive the magnetic field strength along the filament spine, which ranges from 600–1400 Gauss from its apex to the legs. The results agree well with the non-linear force-free magnetic model extrapolated from the pre-flare photospheric magnetogram. The multi-wavelength signatures of the event are consistent with the standard scenario of eruptive flares, except that the eruption failed to fully develop and escape as a coronal mass ejection. We conclude that the partial eruption is likely due to the strong strapping coronal magnetic field above the filament.

Email

yw633@njit.edu

Primary authors: CHEN, Bin (New Jersey Institute of Technology); GARY, Dale; WANG, Haimin (New Jersey Institute of Technology); Dr JING, Ju (New Jersey Institute of Tech); YU, Sijie (New Jersey Institute of Technology); Mr WEI, Yuqian (New Jersey Institute of Tech)

Presenter: Mr WEI, Yuqian (New Jersey Institute of Tech)

Session Classification: Working Group 2: Particle acceleration

Track Classification: Working Group 2: Particle acceleration