

Project Details

ROSES ID: NNH11ZDA001N

Selection Year: 2012

Program Element: Focused Science Topic

Topic: Flare Dynamics in the Lower Solar Atmosphere

Project Title:

Bridging the Gap in Space, from the Ground: Dynamics and Magnetic Fields of Flares in the Photosphere and in the Chromosphere

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Project Member(s):

- Kleint, Lucia ; Co-I/Science PI; FHNW
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Summary:

Imaging instruments are required to capture flares and study the transport of mass, momentum and energy through the solar atmosphere. Of NASA's fleet of spacecraft, SDO provides full Sun magnetic and thermal data every few seconds at 1" resolution. The SDO/AIA UV (160nm) and EUV channels observe material above and at the base of the chromosphere, omitting several scale heights between the chromosphere and corona. From 2012, the UV slit spectrometer IRIS will partly plug this gap by making rapid rasters of chromospheric features. We propose to augment these capabilities using, in particular, the IBIS imaging spectropolarimeter at Sacramento Peak Observatory, and applying sophisticated spectral line inversion techniques to full Stokes photospheric and chromospheric data. Our goal is to investigate the 3D magnetic field configurations in the solar atmosphere necessary for flares to occur and their changes during and after flares.

Our proposed work is essential to this focused science topic, because our complementary observations have the proven capability to (1) capture flares efficiently; (2) measure both thermal and vector magnetic properties of photospheric and chromospheric plasma through the Zeeman effect, (3) study the role of particle beams through their imprint on linear polarization of chromospheric lines. The simultaneous use of space- and ground-based instruments will reveal crucial aspects of the physics of flare phenomena, unattainable otherwise, at a time when the solar activity is increasing. Our work will also help define the next generation of space-based instruments, such as will fly on SOLAR-C.

Publication References:

Summary: no summary

Reference: Kleint, L.; Sainz Dalda, A.; (2013), Unusual Filaments inside the Umbra, The Astrophysical Journal, Volume 770, Issue 1, article id. 74, 11 pp, doi: 10.1088/0004-637X/770/1/74

Summary: no summary

Reference:

Peter, H.; Tian, H.; Curdt, W.; Schmit, D.; Innes, D.; De Pontieu, B.; Lemen, J.; Title, A.; Boerner, P.; Hurlburt, N.; Tarbell, T. D.; Wuelser, J. P.; Martínez-Sykora, Juan; Kleint, L.; Golub, L.; McKillop, S.; Reeves, K. K.; Saar, S.; Testa, P.; Kankelborg, C.; Jaggli, S.; Carlsson, M.; Hansteen, V.; (2014), Hot explosions in the cool atmosphere of the Sun, Science, Volume 346, Issue 6207, id. 1255726, doi: 10.1126/science.1255726

