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Title of Proposed Observation:

Understanding Small-scale Energy Release Phenomena on the Sun (rerun of HOP 203)

Main Objective:

We are going to carry out an observing campaign coordinating New Solar Telescope (NST) at the Big Bear Solar Observatory (BBSO), Interface Region Imaging Spectrograph (IRIS) and Hinode. The interesting targets are small-scale brightenings in and around sunspots (such as Ellerman Bombs, penumbral bright dots and microjets) and jets in quiet Sun (such as network jets, type-II spicules/RBEs).

Scientific Justification:

Small-scale dynamics play an important role in coronal heating and mass transport for the solar wind. In particular, jets, mostly in the form of spicules, may be responsible for carrying energy and momentum sustaining heating and flows. The recent discovery of type II spicules is of particular importance due to their high speed, rapid heating, and large vertical extent. Their on-disk counterpart is believed to be "Rapid Blueshifted Excursions" (RBEs; Langangen et al. 2008). Although the dynamic properties of type II spicules and RBEs have been extensively studied, their formation mechanism is still unclear and need further exploration (e.g., Deng et al. 2015). The disk observations of RBEs in quiet Sun and coronal hole will allow us to study their statistical and magnetic properties in detail.

Recently, using IRIS observation, Tian et al. (2014) discovered subarcsecond short-lived brightenings above sunspot penumbra in the transition region. The formation mechanism of these bright dots and their vertical extent are still unclear. The photospheric and chromospheric observations will help to address these questions.

References:

Langangen, O. et al. 2008, ApJ, 679, L167

Deng, N., Chen, X., Liu, C., Jing, J., Tritschler, A., Reardon, K. P., Lamb, D. A., Deforest, C. E., Denker, C., Wang, S., Liu, R., & Wang, H. 2015, ApJ, 799, 219

Tian, H., Kleint, L., Peter, H., et al. 2014, ApJL, 790, L29

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Dates:

BBSO/NST has granted May 24-28 (fixed) for this campaign observing proposal. If possible please provide support for all the 5 days. Five consecutive days are desired, but not required.

Time window:

16-22 UT. (the good seeing at BBSO is usually from 16 to 22 UT)

Target(s) of interest:

sunspots of any kind (emerging, mature, complex or simple)
on-disk quiet Sun

SOT Requests:

repeat SP IQUV scans (fast map, FOV 110" x 123", 0.32" slit, 20 min cadence) during the coordinated observation. The gaps between SP scans due to the SAA periods are accepted.

EIS Requests:

We will use EIS Study 421.

OBJECTIVE: Observe the same target region as SOT, to measure flows, electron densities and temperatures in RBEs associated jets.

NO. OF RASTERS: 1 (repeat the raster scan during the coordinated hours)

POINTING: Better to align the center of EIS's FOV with the centers of FOVs of SP

XRT Requests:

Ti/Poly images, FOV 192" x 192" in minimum to completely cover the SOT FOV, 1"-resolution, cadence 1 min, Q=95, run during the coordinated observation. Include G-band exposures in very low cadence for alignment purpose. Full-Sun context at the beginning and end of each day coordinated observing run.

IRIS Requests:

We will submit a proposal to IRIS for supporting of this coordinated observing run very soon.

Additional instrument coordination:

BBSO/NST

Previous HOP information:

HOP 203

Deng, N., Tritschler, A., Jing, J., Chen, X., Liu, C., Reardon, K., Denker, C., Xu, Y. & Wang, H. 2013, High-cadence and High-resolution H α Imaging Spectroscopy of a Circular Flare's Remote Ribbon with IBIS, ApJ, 769, 112 (11pp)

Deng, N., Chen, X., Liu, C., Jing, J., Tritschler, A., Reardon, K. P., Lamb, D. A., Deforest, C. E., Denker, C., Wang, S., Liu, R. & Wang, H. 2014, Chromospheric Rapid Blueshifted Excursions Observed with IBIS and their Association with Photospheric Magnetic Field Evolution, ApJ, 799, 219 (9pp.)

Chen, X., Deng N., Lamb, D. A, Jing J., Liu C., Liu R., Park S.-H., & Wang H. 2015, Development of Technique to Detect and Classify Small-Scale Magnetic Flux Cancellation and Rapid Blueshifted Excursions, RAA 15, 1012

Additional Remarks: