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Solar storm prediction through flare forecasting based on multi-line magnetograms

Francesco Berrilli (1), Dario Del Moro (1), Ermanno Pietropaolo (2), and Stuart Jefferies (3)

(1) University of Rome Tor Vergata, Department of Physics, Rome, Italy (francesco.berrilli@roma2.infn.it), (2) University of L'Aquila, Dipartimento di Scienze Fisiche e Chimiche, Italy, (3) Insitute for Astronomy - University of Hawai'i, USA

The capability to predict the physical conditions in near-Earth space (space weather) is of paramount importance to the European society. Sudden changes in space weather, due to solar storms associated to eruptive events such as coronal mass ejections and flares, can impact the technology we rely on every day.
The MOTH instrument, based on magneto-optical filters, is able to perform multi-line, high-cadence synoptic observations of the Sun and solar activity. The multi-line capability means solar atmospheric multi-height analysis capability. As a consequence, MOTH instrument is able to simultaneously evaluate both horizontal and vertical gradients of LOS component of solar magnetic field B. Presently, two telescopes/channels are available at K I 770nm and Na D2 589nm lines with high zero-point stability (about 6 cm/s) and velocity sensitivity of about 7 m/s and magnetic sensitivity of about 5 Gauss in 5 seconds.
Such data provide crucial information on how and when solar storms form. We present preliminary analysis of multi-line magnetograms used to test innovative flare forecasting algorithm.