JOINT CDS/EIT PROGRAMME - JOP121

Strengthening of H^0 Lyman Continuum absorption in disk filaments prior to eruption

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Scientific Justification

This programme is based on results obtained from a study of "Filament Absorption and Emission in Highly Ionized Iron and Neutral Hydrogen" using images obtained with SOHO/EIT (Engvold et al. 2000; currently being submitted for Solar Phys.) and the paper on "Neutral Hydrogen Column Depths in Prominences Using EUV Absorption Features" by Kucera et al. (1998, Solar Phys. **183**, 107). The study by Engvold et al. suggests that the absorption in neutral hydrogen (Ly C) increases significantly 1-3 days prior eruption of the filaments. Also, immediately before, and during eruption one observes significant emission from the prominences/filaments in high temperature lines.

The absorption strength is obtained from the measured contrast of the absorbing filaments relative to the brighter background. The two earlier studies seem to show a wavelength dependence of the absorption as expected from H^0 Ly C, as long as the filaments are in the stable pre-eruptive phase. Closely before eruption the noted hot line emission mixes in with an increasing absorption and change the contrast in a way which somehow seems to depend on the temperature of the lines.

It is the objective of this programme to monitor and study the development of the H^0 Ly C absorption and hot filament line emission as some of the filament goes into eruption. Furthermore, the noted strengthening of the H^0 Ly C absorption is also an interesting and potentially important signature of an approaching eruption. Also, lines at wavelengths shorter than the He^0 threshold at 504Å are included in the programme to see if an additional contribution from neutral He may be detected in the assumed strengthening effect.

The programme will involve monitoring of a number of larger filaments, possibly 3 - 5 each day, with a cadence of 3 sequences per day over a period of two weeks. We also wish to supplement each of the CDS raster scans with one set of EIT images (He I 304Å, Fe IX/X 171Å, Fe XII 195Å, and Fe XV 284Å). The exact locations of each sequence will be determined from ground-based full disk Hα images.

CDS

NIS Study: O_HLYC

Spectrometer: Normal Incidence
Slit: 4×240 arc sec
Step (DX, DY): 4 arc sec, 0 arc sec
Raster Location: Centered on specified filaments
Exposure Time: 40 s
Duration of Rasters: 1404
Number of Rasters: 5-6 rasters, each at selected filament positions, 3 times per day
Total Duration: ≤8424
Line Selection: He I 537.04Å, Fe XIV 334.17Å,
Ca X 557.77Å, Fe XIII 348.18Å, He I 584.33Å,
O III 599.59, Mg IX 368.07Å, Mg X 624.85, O V 629.73Å
Pointing: Pre-selected disk filaments