7.01

A comparison of solar flare hard X-ray bursts with Doppler blueshifted soft X-ray emission.


We have compared solar flare hard X-ray (HXR) light curves with light curves obtained from the blue wing of soft X-ray (SXR) emission lines. In our study of flares with moderate to strong blue and red shifts of X-ray lines, we find a majority of the flares exhibit a good correlation between hard X-ray and blue wing light curves. For a fraction of the flares studied strong blueshifted emission precedes the hard X-ray burst. We have also found a few flares which exhibited blueshifted SXR emission, but for which HXR bursts were weak or nonexistent. If upflows in solar flares are caused by electron beams impinging upon the chromosphere, we expect to see a correlation between HXR emission from the electron beam and the Doppler shifted SXR emission from the upflow. We present comparisons of SXR and HXR solar flare emission and comment upon the consequences of these observations for solar flare models.

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7.02

EUVE Observations of a Large Flare on AU Mic

S.L. Colly, O.H.W. Siegmund (SS/L/UCB), Peter Vedder, John Vallerga (UCB/CEA)

We have made the first observation of a stellar flare in the EUV at 100 second time resolution. The flare was first detected on AU Mic by the EUVE Deep Survey Instrument at 15:36 UT on July 15, 1992 during a four day observation from July 14 -18, 1992. This was a large flare detected in the Lexan/Boron (65 - 190 A) band with an observed peak count rate of approximately 7 counts per second corresponding to a peak luminosity of 10^26 ergs sec^-1 in our bandpass. This is significantly above the measured quietest level of 0.4 ± 0.2 counts per second. The flare consisted of a sharp impulsive peak lasting approximately 2 hours followed by a decaying tail that lasted a day. We compare this EUV observation with stellar and solar flare observations in other bandpasses.

7.03

Echelle Spectra of the 6 March 1993 Solar Flare

C.M. Johns, G.S. Basri (UC Berkeley), and S.L. Hawley (LLNL)

We report on a successful program designed to use the Hamilton Echelle stellar spectrograph at Lick Observatory to take spectra of solar flares. The 0.6m Coudé Auxiliary Telescope (CAT), together with a mylar coated filter which stops the aperture down to approximately 8 inches, is used to feed the spectrograph. A siderostat tracks the Sun and feeds the CAT as well as an 8-inch Meade Schmidt-Cassegrain telescope equipped with a Daystar Hα filter. The Hα image is aligned with the optical image feeding the spectrograph so that the CAT can be pointed at any feature seen in the Hα image. Current pointing accuracy is a few arcseconds. With this setup we obtain high resolution (λ/Δλ ~ 48000) spectra over the entire optical region from approximately 3800 to 9000 Å in a single exposure.

On 6 March 1993 we observed a relatively large M7.5 solar flare event. Our observations begin before flare maximum, and continue for more than an hour. Indications of electron precipitation in the form of a broad, double peaked Hα emission core are observed. At these times Hβ shows a similarly broad emission core without the double peaked profile and the Ca II infrared triplet contain sharply peaked emission cores. We present our high signal/noise spectra and a preliminary analysis.

7.04

A Study of the Magnetic Field Associated with C-class Flares

M. Adams and M. J. Hagyard (NASA/MSFC)

Few studies have been made of the magnetic configuration surrounding the active regions which spawn C-class flares, even though these events occur more frequently than those in the higher energy M- and X-classes. Using data obtained with the MSFC vector magnetograph, we examine many such active regions for temporal variations in magnetic parameters such as: shear index, transverse field, the longitudinal field, the difference between the observed and potential fields, and the difference between the observed and potential azimuth of the field.

Taking the time of a flare event to be t=0, we plot values of the magnetic parameters, both pre- and post-flare, within a specified field of view as well as along the neutral line. In so doing, we are searching for patterns and changes of the above parameters which could be generalized to aid flare prediction. By comparing data from different active regions, we seek to determine if a similar physical process is responsible for all flares.

7.05

Evolution and Flare-Associated Magnetic Shear Variation in Solar Active Regions

A. Ambastha (NRC/MSFC), H.J. Hagyard, and E.A. West (NASA/MSFC)

Vector magnetic field observations have indicated that strong transverse fields and magnetic shear are usually associated with large flares. However, there are cases where strong shear existed in regions with no major flares, and also where large flares occurred in regions with no shear. It is, therefore, desirable to determine how various parameters evolve during active region's evolution, and during the time of flares. We have studied the evolution of nonpotential magnetic fields in NOAA AR 6555 during March 23 - 26, 1991, using a quantitative description of shear. It is found that flare-active areas evolved more significantly in the overall structure. Flare ribbons mostly formed in areas bordering, and not within the areas of strong shear.