

# Estimating the back-illumination of the chromosphere for the 2011-02-15 flare

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## Abstract

One of the main ingredients of the energetics of the flaring chromosphere is back-illumination from the flaring corona. In the recent time observational data became available, which can be used as an empirical constrain for the back-illumination. The goal of this study is to infer the EUV heating of the solar chromosphere in gradual phase of the flare 2011-02-15. Overlying EUV loops are assumed to have a semi-circular static symmetric configuration, following Refs. [1-2]. SDO AIA and EVE data are utilised for estimating the spatial and spectral distribution of the EUV emitter sources, in a procedure analogous to analysis in Ref. [3]. Modelling by the FLARIX code is ongoing, Refs. [4-7]. Preliminary inferring of the energetics of the EUV coronal back-illumination is presented.

## Combining EVE and AIA data

Observation of the EVE spectrum with applied AIA filter response function is supposed to give a quantity of the radiant flux at a selected time. Combination of radiant flux from the EVE data and the estimated flaring surface from the AIA data provides irradiance of the selected narrow band emission, which can be utilised in modelling.

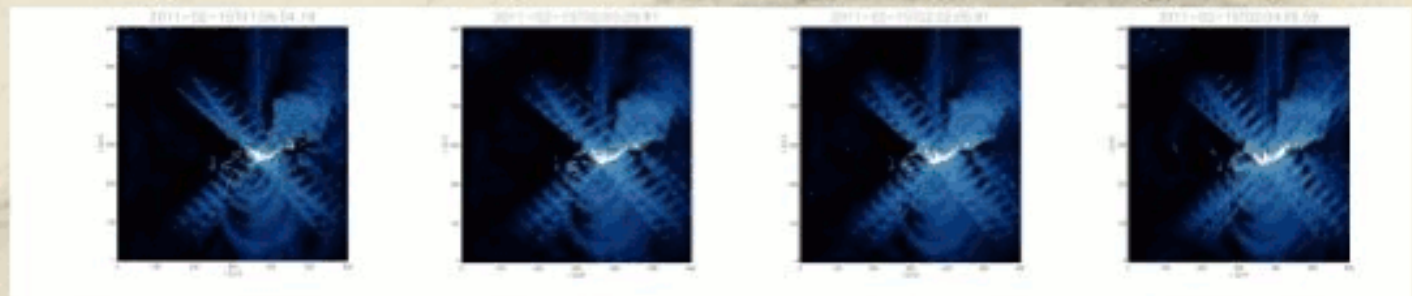
## SDO AIA A335 residual images with overplotted $3\sigma$ contours

pre-flare

impulsive phase

gradual phase I

gradual phase II



## 2011-02-15 event

NOAA 11158

X2.2 flare

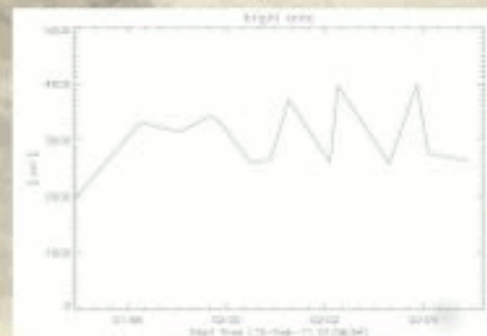
Start time: 01:35:34

Peak time: 02:00:00

End time: 06:21:46

Areas of interest in the EVE data are identified. Part of the EVE spectra corresponding to the AIA A335 channel is found to be the best proxy. "Quiet" Sun in the AIA images is determined. The best method of inferring the size of a brightened flaring surface in the AIA images is found to be  $3\sigma$  above the mean value of the residual images in the pre-flaring Sun in the fov.

Integrated intensity from the EVE continuum data is correlated to the whole disc radiation in the AIA images. Based on the estimated flaring area and adjacent fraction of integrated intensity from the EVE data irradiances for two channels, A335 and A334, are determined up to a constant at a sequence of times. The empirically obtained time sequences of irradiances are input for the code.



## References

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