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On the dependence of the magnetic field of coronal holes on their areas

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The evolution of the averaged longitudinal magnetic field and area of the low latitude coronal hole during its passage through the central meridian near an equator from February to October 2012 is considered. The CHIMERA code [2] posted on the website https://solarmonitor.org, as distinguished from the earlier work [1], is used. It has been shown that contours of corona holes strongly depends on the selected method of their determination. The correlation between the magnetic field of the coronal hole and its area was not revealed. The consequences of results are discussed in the light of the coronal-sunspot analogy proposed by Obridko and Nagovitsyn [3].

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Simultaneous observations of K Ca II, Hδ and He I 4471.5 Å lines in a limb solar flare

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We present the study of the limb solar flare of 17 July 1981 according to the observations carried out with the Echelle spectrograph of the horizontal solar telescope of the Astronomical Observatory of Taras Shevchenko National University of Kiev. We analysed the $I \pm V$ profiles of the K Ca II 3933.7 Å, Hδ 4101.7 Å and He I 4471.5 Å lines for 8^h17^m UT, close to the flash phase. The lines had very wide emission profiles with wing lengths of 5–8 Å. In the violet wings of these lines the narrow emission peaks with widths of only 0.25–0.35 Å were present (Fig. 1). Our observations of such narrow emission components in limb solar flares at altitudes of 10–14 Mm above the level of photosphere are the first direct data of this kind.

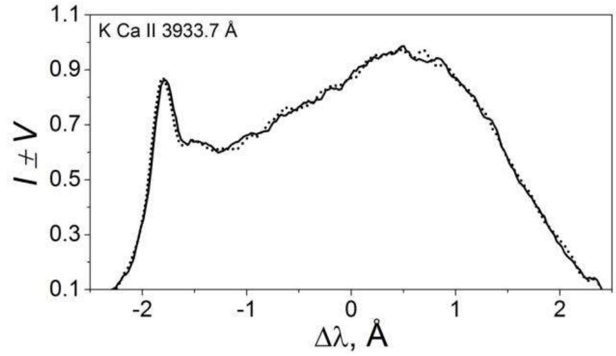

Fig. 1. The $I \pm V$ profiles of the K Ca II line in the photometric section No. 2. A narrow component in the 'violet' wing of the flare emission (at Δλ ≈ –1.8 Å) is clearly visible.

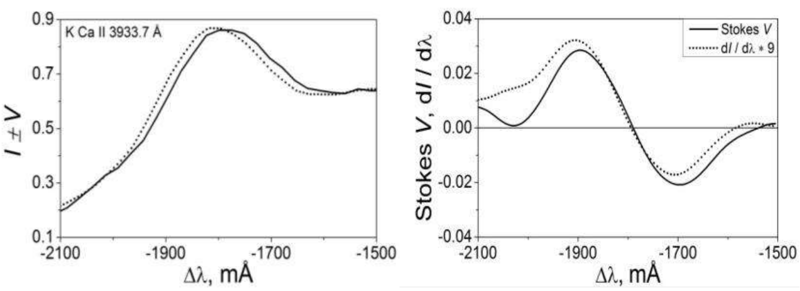

Fig. 2. Magnetic field measurement in the K Ca II line by the splitting of narrow emission peaks (on the left) and by the amplitude of the Stokes V parameter (on the right).

Under assumption that all three spectral lines are formed in the same volume of the flare, we found that the temperature in the flare was in the range of 5000–17000 K and the turbulent velocity – in the range of 11–13 km/s. The magnetic field was measured by two different methods, namely by the splitting of narrow emission peaks and by the amplitude of the Stokes *V* parameter (Fig. 2), was found to be 1300–2100 G. The values of the local magnetic fields in the flare may be even larger since the obtained results represent a longitudinal component of the magnetic field, with the assumption that the filling factor equals unity.

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A program on processing the solar spectra scans

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We present a program on processing the solar spectra scans. It serves as a convenient tool for obtaining the spectral line profiles from the scans of spectrograms. The program is set to perform the following primary actions:

1. Convert optical densities of the spectrogram into spectral line intensities for the selected photometric section using the characteristic curves of the scanner and the photo-emulsion.
2. Calculate the correct wavelengths knowing the dispersion value for the line under processing.
3. Make additional adjustments including noise subtraction and smoothing.

The program provides user-friendly interface, displaying the processed line, the specified photometric section and the corresponding spectral profile preview (Fig. 1). The output is saved in a common *.dat file format. The program is suitable for scans obtained by both reflection and transmission scanning techniques and is readily-configured for use with the Epson Perfection V 550 scanner.