Nature of Prominences and their role in Space Weather
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Coronal Multi-channel Polarimeter at the Lomnicky Peak Observatory

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Abstract. Coronal Multi-channel Polarimeter (CoMP-S), developed by HAO/NCAR, has been introduced to regular operation at the Lomnicky Peak Observatory (High Tatras in northern Slovakia, 2633 m a.s.l.) of the Astronomical Institute of Slovak Academy of Sciences. We present here the technical parameters of the current version of the instrument and its potential for observations of prominences in the visual and near-IR spectral regions. The first results derived from observations of prominences in the Hα emission line taken during a coordinated observing campaign of several instruments in October 2012 are shown here.

Keywords. solar instrumentation, spectroscopy, prominences

The Coronal Multi-channel Polarimeter (CoMP-S) was installed on the coronagraph (Lexa, 1966) of the Lomnicky Peak Observatory of the Astronomical Institute of SAS in March 2011 and nowadays it performs regular observations.

The CoMP-S instrument (Kučera *et al.*, 2011) is based on the concept of the CoMP instrument installed nowadays at the Maona Loa Observatory (Tomczyk *et al.*, 2008). Its core is a tunable 4-stage Lyot filter equipped with a Stokes polarimeter. It can operate in visible and near IR wavelength ranges from 500 to 1100 nm. This broad interval is allowed due to the latest achievements in polarizing materials: birefringent material VIS700BC4 by CODIXX and super-achromatic APSAW half-plates by ASTROPRIBOR. The following emission spectral lines of corona – Fe XIV 530.3 nm, Ca XV 569.5 nm, Fe X 637.5 nm, Fe XI 789.2 nm, Fe XIII 1074.7, 1079.8 nm – and prominences – He I 587.6 nm, H I 656.3 nm, Ca II 854.2 nm, He I 1083.0 nm can be observed. The Lyot filter bandpass width (FWHM) varies from 0.028 to 0.13 nm and its free spectral range is between 0.50 and 2.5 nm. Two orthogonal polarization states slightly shifted in wavelength are acquired simultaneously by two separate detectors. This allows subtraction of scattered light. The pco.edge sCMOS cameras by PCO are giving final image sampling of 0.33 arcsec/pixel and the FoV of 860×680 acrsecs (for wavelength of 656 nm).

Examples of the CoMP-S observations are shown in Fig. 1. The data were taken during the HOP186 coordinated campaign "Mass loading of quiescent prominences from multi-wavelength observations". A quiescent prominence was observed in the Hα spectral line tuning the filter to 9 positions across the spectral profile with four individual polarizations per wavelength step. The detector exposure time was 50 ms. Reduction has been done only in the Stokes I profile with binning of 4×4 pixels leading to the final spatial sampling of 1.3 arcsecs. Each spectral profile detected with maximum intensity greater than 4000

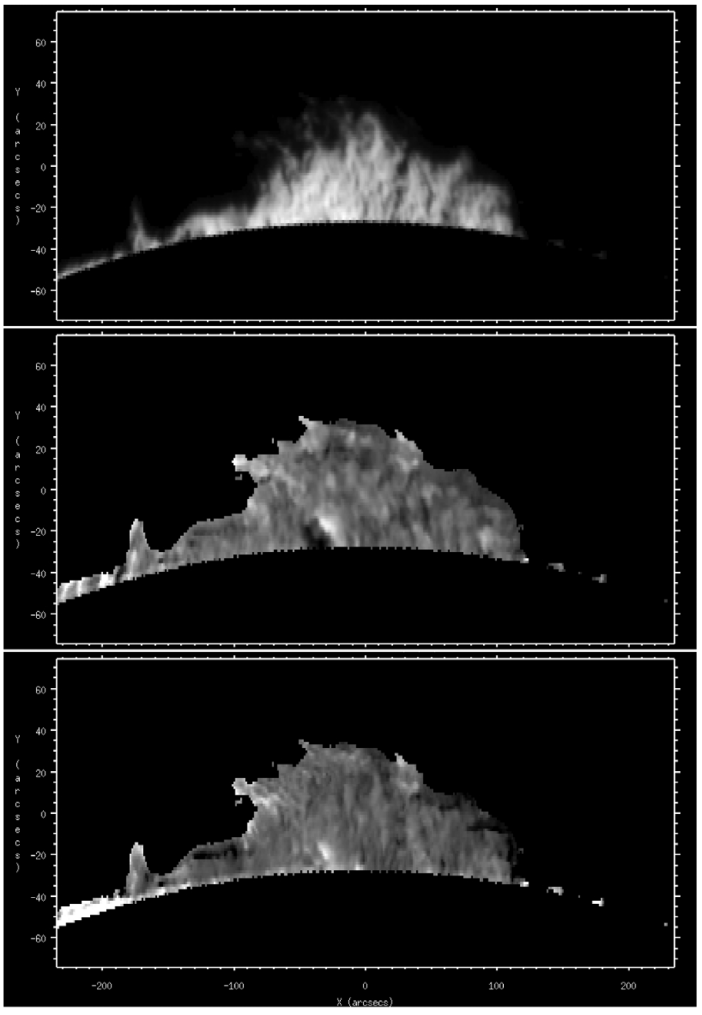

Figure 1. The line profile amplitude (top panel), the Doppler velocity (middle panel), and the Gaussian line width (bottom panel) of the Hα spectral line derived for the quiescent prominence observed on 20/10/2012 at 07:06 UT at the position angle 170°. The displayed ranges are $\pm$12 km/s for the Doppler shift range and 0.020-0.045 nm in case of the Gaussian line width.

counts above background was fitted by single Gaussian. The line profile amplitude, the Doppler shift (km/s), and the Gaussian line width (nm) were then derived.

Work on an extension of the original CoMP-S for data acquisition at wavelengths longer than 900 nm is now in progress preparing incorporation of IR detectors to the instrument (camera model Goodrich GA1280J by the Sensors Unlimited). Expected time of installation of this extension to the original instrument is January 2014 and full operation of the CoMP-S instrument is planned during summer 2014.

References

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