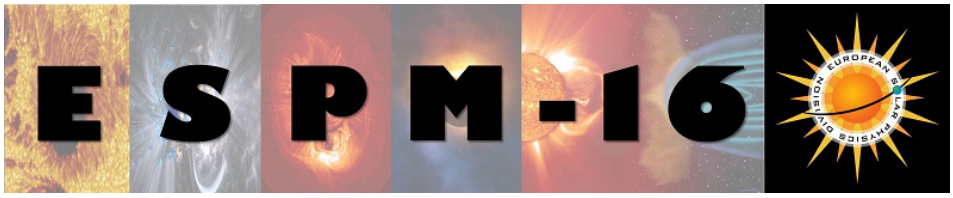

Contribution ID: **400** Type: **Poster**

Multi-line Stokes I inversions to infer magnetic fields in the spectral range around Cr I 578.2 nm

Thursday 9 September 2021 11:39 (13 minutes)

The spectral window in the solar photosphere around the magnetically sensitive Cr I lines at 578.2 nm is explored. The goal is to analyze simultaneously 15 spectral lines, which comprise Cr I, Cu I, Fe I, Mn I, and Si I lines, without polarimetry to infer the thermodynamic and magnetic properties in a strongly magnetized plasma using the SIR inversion code.

The study is based on a new detector setup at the Echelle spectrograph of the Vacuum Tower Telescope (VTT) at Tenerife, which enables fast spectroscopic scans. The oscillator strengths of all spectral lines are determined, as well as their response functions to temperature, magnetic field, and Doppler velocity. The snapshot 385 of the Enhanced Network simulation from the Bifrost code serves to synthesize all the lines, which are in turn inverted simultaneously with SIR to establish the best inversion strategy. This strategy is then applied to VTT observations of a sunspot in active region NOAA 12723 on 2018 September 30, and the results are compared to full-disk vector field data obtained with the Helioseismic and Magnetic Imager (HMI).

The analyzed spectral range has the potential to deliver thermal, dynamic, and magnetic information in strongly magnetized features on the Sun, such as pores and sunspots, even without polarimetry. The highest sensitivity of the lines is found in the lower photosphere, on average around optical depth $\log \tau = -1$. The multiple-line inversions provide smooth results across the whole field-of-view.

Student poster?

Do you want to be considered for a student poster prize?

Author: KUCKEIN, Christoph (Leibniz Institute for Astrophysics Potsdam (AIP))

Co-authors: Dr BALTHASAR, Horst; Dr QUINTERO NODA, Carlos (Instituto de Astrofísica de Canarias); Ms DIERCKE, Andrea (Leibniz-Institut für Astrophysik Potsdam (AIP)); Mr TRELLES ARJONA, Juan Carlos (Instituto de Astrofísica de Canarias (IAC)); Dr RUIZ COBO, Basilio (Instituto de Astrofísica de Canarias); FELIPE, Tobias (Instituto de Astrofísica de Canarias); Prof. DENKER, Carsten; Dr VERMA, Meetu (AIP); KONTOGIANNIS, Ioannis (Leibniz-Institute for Astrophysics Potsdam (AIP)); Dr SOBOTKA, Michal (ASU)

Presenter: KUCKEIN, Christoph (Leibniz Institute for Astrophysics Potsdam (AIP))

Session Classification: Poster Session 10.1

Track Classification: Session 2 - The Solar Atmosphere: Heating, Dynamics and Coupling