The CLASP Telescope. Modified for Mg II
The CLASP instrument was originally designed for studying H Lyman α (Bascones et al., 2012). For CLASP II, we have reused it with minor modifications to observe the Mg II lines at 280 nm. The instrument consists of a Cassegrain telescope, a dual-beam spectrophotometer assembly with a grating serving as a beam splitter, a polarimeter including a rotating waveplate and an identical pair of transmissive polarization analysers, and a slit imaging spectrometer. The overall layout and baseline design parameters are shown in the figure above. The optical elements that will be updated for CLASP II are indicated by the red text in the figure.

The polarimeter system consists of a rotating waveplate and two transmissive polarization analysers. The rotating waveplate allows measurements of the components of the full Stokes vector and with fixed polarization analyzers. The optical components between the waveplate and the polarization analysers are oriented to minimize polarization errors and crosstalk: the ruling of the grating is parallel or perpendicular to the polarizer and analyzer pairs, and the minimum in crosstalk of the grating is obtained around the same axes. These configurations were adopted for CLASP I, and an end-to-end polarization calibration of the spectropolarimeter system verified that the residual Q - O-U cross-talk corresponded to an azimuth error of 0.5 deg (Ishikawa et al., 2014; Gomes et al., 2016).

We have considered the impact of the spectral resolution on the polarization signatures by calculating the Stokes profile with gaussian functions of different widths. A spectral resolution at least 0.01 nm is sufficient to recover the line-center Q/I and U/I signals without significant deterioration, and to detect the antisymmetric Q/I signals for longitudinal fields as weak as 50 G (see figure below).

Acquisition and Demodulation
Data is acquired in dual-beam rocket flight in the spring of 2019. During flight we will observe three targets. The first is a disk center CLASP I observation close to the limb produced by scattering processes in the upper corona. The second is a plane polarized Mg II line, taking into account the magnetic effects on the Mg II line. The photon counts are high enough to obtain a signal-to-noise ratio of 20:1+100 using a single detector. The third target is a plane polarized Mg II line, taking into account the magnetic effects on the Mg II line. The photon counts are high enough to obtain a signal-to-noise ratio of 20:1+100 using a single detector.

Therefore, to make progress towards a better understanding of the solar chromosphere, CLASP II will measure the wavelength variation of all four Stokes parameters in the spectral region between 279.45 nm and 280.35 nm, specifically in Mg II lines sensitive to the physical conditions of the solar atmosphere throughout a diagnostically important range of heights.

**Scientific Objectives**

**What is the magnitude and geometrical polarity of the complex upper chromosphere and quiet regions?**

**Measurements of the magnetic field and line broadening quantified using the full Stokes vector.**

**D. E. McKenzie (NASA MSFC), R. Ishikawa (NAOJ), J. Trujillo Bueno (IAC), F. A. Rocha (IAP), M. Kobayashi (NAOJ), K. Kobayashi (NAOJ), A. Winnewisser (NASA MSFC), C. Bethge (USRA), N. Narukage (NAOJ), R. Han (NAOJ), S. Ishikawa (IIA), D. Bonfils (ESO/LAM), M. Carlsson (LGO), M. Noah (Hertfordshire), L. Belluzzi (RISO), S. N. Ono (IEO), T. Dei, A. B. I. Belleter (IAC), A. Assenio Ramos (IAC).**


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**Technical Details**

**The H Bands**

The Mg II H bands consist of two closely spaced but distinct hydrogen-like transitions of the Mg II ground state. The former, Mg II "Hα" at 517.5 nm, is a strong resonance line, which can be observed in the solar chromosphere and transition region. The latter, Mg II "Hβ" at 457.1 nm, is a weak but important transition that is often used as a diagnostic of magnetic fields. The Mg II Hα line is one of the most sensitive magnetic-sensitive lines in the solar atmosphere, and it is used for studying the magnetic fields in the solar chromosphere and transition region. The Mg II Hα line is observed with a high spectral resolution, typically 0.01 nm, and its intensity is sensitive to the magnetic field strength in the solar atmosphere. The Mg II Hα line is used for measuring the magnetic field strength in the solar atmosphere, and it is one of the most sensitive magnetic-sensitive lines in the solar atmosphere.

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**References**


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**Figure Legends**

**Top left: Theoretical estimate of the Mg II Hα and Kα line magnetic fields.** The theoretical estimate of the Mg II Hα and Kα line magnetic fields is shown in the top left panel of the figure. The theoretical model takes into account the magnetic field strength and its orientation in the solar atmosphere, and it is used for measuring the magnetic field strength in the solar atmosphere.

**Top right: Theoretical estimate of the Mg II Hα and Kα line magnetic fields.** The theoretical estimate of the Mg II Hα and Kα line magnetic fields is shown in the top right panel of the figure. The theoretical model takes into account the magnetic field strength and its orientation in the solar atmosphere, and it is used for measuring the magnetic field strength in the solar atmosphere.

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