

CLASP2: High-Precision Spectro-Polarimetry in Mg II h & k

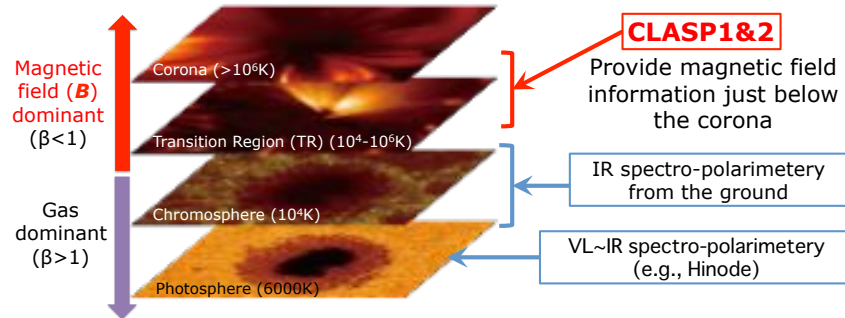
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Abstract

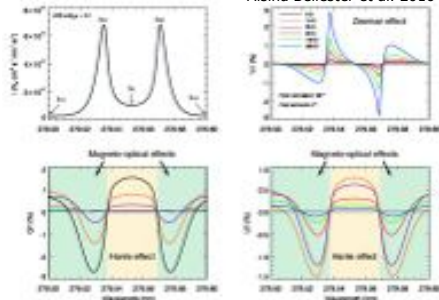
The international team is promoting the CLASP2 (Chromospheric LAYer Spectro-Polarimeter 2) sounding rocket experiment, which is the re-flight of CLASP (2015). In this second flight, we will refit the existing CLASP instrument to measure all Stokes parameters in Mg II h & k lines, and aim at inferring the magnetic field information in the upper chromosphere combining the Hanle and Zeeman effects. CLASP2 project was approved by NASA in December 2016, and is now scheduled to fly in 2019.

UV spectro-polarimetry: new window in solar physics



Polarization signals in Mg II k

Alsina Ballester et al. 2016



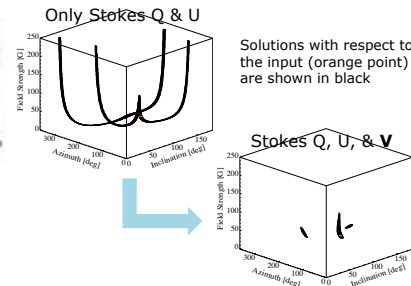
Stokes Q & U (linear pol.)

- Line core: scattering pol. & Hanle effect
- Wing: scattering pol. & Magneto-Optical effect

Stokes V (circular pol.): Zeeman effect

Advantage of Mg II h & k (importance of Stokes-V)

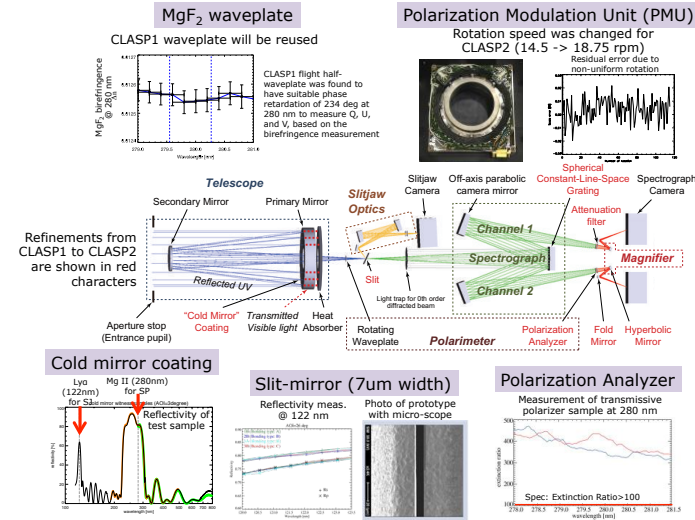
- Direct confirmation of B (i.e., Hanle effect) (c.f., Ishikawa et al. 2017)
- Significant reduction of the inversion uncertainty (see below)
- Larger sensitivity range to B



CLASP1 instrument + CLASP2 new structure

Progress of development

- Component level development was completed
- Optical design is fixed, and new structure is under final designing
- Fabrication of flight components is in progress



Summary of CLASP2 observation

	CLASP1 (2015)	CLASP2
Observables	Stokes-I, Q, U	Stokes-I, Q, U, V
Spectral Lines	Ly α (122 nm) & Si III (121 nm)	Mg II h & k at 280 nm
Resolution	0.01 nm (λ), 2-3" (spatial)	0.01 nm (λ), 1-2" (spatial)
SP FOV (slit length)	400"	200"
Observation target	Quiet Sun (Disk center & close to limb)	Quiet Sun (Disk center & close to limb) & Plage

Pointing plan & purpose for each target

- Quiet Sun @ disk center for 15 sec: On-board polarization calibration
- Quiet Sun @ close to limb for 155 sec: Derive CLV of scattering pol. and compare with CLASP1 result
- Plage for 50 sec: Infer the vector B in upper chromosphere by measuring Stokes Q, U, and V

Coordinated observation (with IRIS and ground-based observatories)

- Highly anticipated to study the direct comparison between B and dynamical activity in upper chromosphere.