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Overview and Observation Results of the CLASP2 and 2.1 Suborbital Space Mission for Measuring Chromospheric Magnetic Fields

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One of the major remaining challenges in solar physics is to decipher the magnetic structure of the solar upper atmosphere, which plays a crucial role in understanding solar atmospheric activity and heating.

To this end, we have developed an unprecedented ultraviolet spectropolarimeter called Chromospheric LAyer Spectro-Polarimeter (CLASP2)[1] with the goal of achieving high-precise measurements (<0.1% at 3σ) of the linear and circular polarizations across the Mg II h & k lines (280 nm)[2]. On April 11, 2019, CLASP2 was launched on board a NASA sounding rocket, and successfully demonstrated for the first time in the world that magnetic fields can be directly measured at multiple chromospheric heights, from the lower to the upper chromosphere, using the two Mn I lines and Mg II h and k lines[3].

CLASP2 was fully recovered after its flight, and we performed the second sounding rocket experiment on October 8, 2021 (hereafter, CLASP2.1). The purpose of CLASP2.1 is to map the solar magnetic field over a 2D field of view (FOV). During the CLASP2.1 flight, we scanned 16 positions in an active region plage, and successfully measured the four Stokes profiles within a FOV of 32”x196”. Recently, the CLASP team has developed the Tenerife Inversion Code (TIC) for inferring the magnetic field information from this type of data[4].

In this talk, we present an overview of the CLASP2 and CLASP2.1 suborbital space mission and the important observation results obtained from them.

Figure 1. CLASP2 sounding rocket and team at the white sand missile range (Courtesy of WSMR Visual Information Branch).

References

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