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HIP41378 multi-planetary system: a testbed for long-period planets analysis with PLATO

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HIP41378 is a fascinating system hosting at least 5 exoplanets discovered by the K2 mission in 2016. The study of this system is a unique opportunity to prepare the PLATO mission for 3 main reasons: the host is a bright (V=8.9) asteroseismic target typical of the P1 sample, the planets are transiting, and they have long orbital periods (from 2 weeks to 1.5 years). Particularly, HIP41378f, a 'Super-Puff' planet with a Saturn-like size and a mild temperature, stands out due to its unusually low density (~0.2 g/cm3), which is not fully understood yet. Comparative planetology within the system will be crucial to comprehend its nature. Ground-based follow-up observations over several years have led to a new understanding of the system's configuration. This system's analysis requires the combination of multiple observation techniques, including high-precision photometry and radial velocity measurements, transit-timing variations analysis, the Rossiter-McLaughlin effect, and stellar variability correction. These techniques will be essential for analyzing PLATO's planetary systems. In this talk, I will provide an update on the latest findings on this system, including the strategy adopted for the worldwide observation campaign focused on the long-duration transit of HIP41378f. It will also highlight the new challenges presented by the characterization of long-period planets, contrasting with short-period planets. The lessons learned from the study of this unique system will guide the observational and analysis strategy for the PLATO mission.

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