

CUTE: A Small NUV Satellite Mission to Study Exoplanet Atmospheres

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Abstract

Exoplanets in short-period orbits provide a unique opportunity to observe phenomena critical to the development and evolution of our own solar system, including atmospheric escape, interaction with the host star, and the potential to study exoplanetary magnetism. At present, the theories explaining atmospheric mass-loss exceed the number of relevant transit observations because these processes cannot be observed in broad-band visible/NIR light curves. Owing to their large sizes and short-periods, the physics of atmospheric mass-loss can be studied with a dedicated small instrument operating in the near-ultraviolet. We present the Colorado Ultraviolet Transit Experiment (CUTE), a 6U CubeSat mission that will spectrally isolate diagnostic atomic and molecular transitions arising within the upper planetary atmospheres to study the physics of atmospheric escape and possibly detect the presence of magnetic fields on exoplanets. CUTE is planned for launch in mid-2020, with a baseline survey program designed to observe about 10 transits of approximately 12 bright exoplanetary systems. We further present the CUTE data simulator, which is a versatile tool easily adaptable to any other mission performing single slit spectroscopy and carrying on-board a CCD detector. CUTE's flexible observing plan also allows for coordinated UV-optical-infrared observations of particularly interesting bright targets with a number of current and future facilities. Detailed information about CUTE can be found in Fleming et al. (2018; [1]).

project ACUTEDIRNDL P859718. CUTE is supported by NASA grant NNX17AI84G (PI - K. France) to the University of Colorado Boulder.

References

- [1] Fleming, B. T., France, K., Nell, N., et al. 2018, *Journal of Astronomical Telescopes, Instruments, and Systems*, 4, 014004

Acknowledgements

L.F. and S.A.G. acknowledge financial support from the Austrian Forschungsförderungsgesellschaft FFG