

Abstract Submitted  
for the 4CF14 Meeting of  
The American Physical Society

**Atmosphere of a Transiting Hot-Jupiter System, Probed in the Lyman-alpha Band** LOUIS OBERTO, Penn State University, ZHENG ZHENG, University of Utah — A Jupiter-like extrasolar planet (i.e., a hot-Jupiter), close to the host star, can have an atmosphere extending to several times the planet radius, as a result of heating from the star. Such an extended atmosphere is transparent to visible light and hard to be observed in the optical band. However, in the Lyman- $\alpha$  band, the extended atmosphere can be detected, because of the interaction of Lyman- $\alpha$  photons with the neutral hydrogen atoms in the atmosphere. A fraction of the Lyman- $\alpha$  photons emitted from the star are intercepted by the planet, and these photons experience resonant scattering in the planet's atmosphere and eventually escape the atmosphere. Therefore, in the Lyman- $\alpha$  band, the planet appears to be effectively emitting light. We perform a Lyman- $\alpha$  radiative transfer study of a model transiting hot-Jupiter system. In the Lyman- $\alpha$  band, the transit signal is much stronger (compared to that in the optical band), due to the extended atmosphere. The effective Lyman- $\alpha$  emission from the planet also shows a phase variation as the planet orbits around the star. We investigate how the transit and phase-change light curve depends on the distribution of neutral hydrogen in the atmosphere, as well as the velocity of the atmosphere.

Louis Oberto  
Penn State University

Date submitted: 11 Sep 2014

Electronic form version 1.4