Upper-Atmosphere Exoplanet Constraints from Ultraviolet Transmission Observations

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The discovery of thousands of exoplanets has unveiled a staggering diversity in their physical properties and environments. It is thought that the observed distribution of planetary masses and radii is the direct outcome of planet formation processes and subsequent evolutionary interactions with their host stars. These processes can be further understood by studying the structure, composition, and loss of exoplanetary atmospheres. Of particular importance is the study of the uppermost layers of an atmosphere (below 1 micro-bar), where atmospheric escape is expected to take place. Detecting and characterizing escaping species in these regions enables us to constrain key properties such as thermal structure, mass loss rates, compositional changes, and star-planet interactions. In this presentation, I will provide an overview of current efforts to probe the upper atmospheres of exoplanets through ultraviolet and optical observations. I will discuss the implications of these observations for our understanding of atmospheric mass-loss regimes, as well as the observational, laboratory-data, and modeling challenges associated with these studies.