



4<sup>th</sup> Annual

# JOHN BAHCALL LECTURE

DECEMBER 9, 2009



## PROF. SARA SEAGER

Ellen Swallow Richards Assoc. Professor of Planetary Sciences & Astrophysics  
Massachusetts Institute of Technology

**“Exoplanets: From Discovery to Characterization & Beyond”**

**3:00 PM**

in the John Bahcall Auditorium of STScI

3700 San Martin Drive • Baltimore, MD 21218

At the dawn of the first discovery of exoplanets orbiting sun-like stars, fourteen years ago, few believed that exoplanet atmosphere observations were possible. Seven years ago, after the Hubble Space Telescope observation of the transiting HD 209458b atmosphere, many skeptics challenged it as a one-object, one-method success. With over two dozen exoplanet atmospheres observed today, we have solidly entered the first stage of exoplanet atmosphere research. I will review the highlights of hot Jupiter atmosphere studies: detection of molecular spectral features; constraints on atmospheric vertical structure; and diversity of day-night temperature gradients. I will show what we can robustly infer from the two best transiting hot Jupiter atmosphere data sets using a new atmospheric temperature and abundance retrieval method. As hot Jupiter observations and interpretation are maturing, the next frontier is super Earth atmospheres. Theoretical models are moving forward with observational hopes pinned on the James Webb Space Telescope, scheduled for launch in 2014. I will conclude with an update on the realistic but futuristic attempt to answer the enigmatic and ancient question, “Are we alone?” via detection of atmospheric biosignatures..

### Reception to Follow Lecture