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The GEMINI/GMOS optical transmission spectral survey of close-in gas giant exoplanets

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for the 2020 Astronomy and Astrophysics Decadal Survey. The study team envisions a large aperture, actively-cooled telescope covering the full mid- to far-infrared spectrum enabling revolutionary scientific discoveries in many areas including: 1) OST will probe our earliest cosmic origins by charting the rise of dust and metals in galaxies over cosmic time, and determine how the coevolution of star formation and supermassive black holes leads to the diversity in galaxies today, 2) OST will follow the trail of water from the birth of the planet-forming disk to the assembly of pre-planetary materials, and in comets to understand the origin of Earth's oceans, and 3) OST will measure biosignatures in transiting exoplanet atmospheres at mid-infrared wavelengths to assess the habitability of nearby exoplanets and search for signs of life. Equally important to these compelling questions, OST will be a flagship general observatory which provides the astronomical community access to unprecedented discovery space in the infrared. OST will be up to a factor of 1000 more sensitive than previous infrared space telescopes. Its versatile instrument suite will enable deep and wide 3D surveys of the sky from the most distant galaxies to the outer reaches of our Solar system. This presentation will describe the OST baseline mission concept and spotlight its vast science potential.

222.04 — LUVOIR: Telling the Story of Life

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The Large UV/Optical/Infrared Surveyor (LUVOIR) is one of four large mission concepts for which the NASA Astrophysics Division has commissioned studies by Science and Technology Definition Teams (STDTs) drawn from the astronomical community. We have developed two architecture variants: Architecture A with a 15-meter segmented primary mirror, and Architecture B with an 8-meter segmented primary mirror. LUVOIR will operate at the Sun-Earth L2 point. It is designed to support a broad range of exoplanet, astrophysics, and Solar System studies. The candidate instruments studied for LUVOIR are 1) a high-performance NUV/optical/NIR coronagraph with imaging and spectroscopic capability, 2) a UV imager and spectrograph with high spectral resolution and multi-object capability, 3) a high-definition wide-field optical/NIR camera, and 4) a high-resolution UV spectropolarimeter. LUVOIR is designed for extreme stability to support unprecedented spatial resolution and high-contrast direct observations of Earth-like exoplanets. It is intended to be a long-lifetime facility that is serviceable, upgradable, and primarily driven by guest observer science programs. In this presentation, we will describe the observatories and provide an overview of the transformative science LUVOIR can accomplish.

223 — Extrasolar Planets: Characterization & Theory Track 1: VIII. Measurements and Models of of Giant Planet Atmospheres D

223.01 — The GEMINI/GMOS optical transmission spectral survey of close-in gas giant exoplanets

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Estimating the nature and abundances of chemical species and clouds in exoplanetary atmospheres forms the backbone of comparative exoplanetology. We present a long-term ground-based survey of a dozen transiting hot Jupiters observed in the visible bandpass using the Gemini Multi-Object Spectrograph (GMOS). By observing transits of an ensemble of hot Jupiters spanning a range of masses, radii, and host star types, and using a consistent methodology for extracting their transmission spectra across the sample, we derive common properties for their atmospheres. We present the main results of this survey, the challenges faced by such an experiment, and the lessons learned for future MOS observations and instrument designs. Ultimately, this survey aims at improving our understanding of the diversity of physical processes at play in exoplanetary atmospheres.