RSPP seminars

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"Solar System Science with Astrophysics Assets: JWST and beyond"

Next generation space-based telescopes and instrumentation will offer unprecedented sensitivity and spatial resolution at wavelengths that are inaccessible from the ground due to the Earth's atmosphere. These spectral regions host a number of molecular lines and spectral features including: CO2, H2, NH3, PAHs, etc. Such facilities work in concert with large ground-based facilities to address key questions of chemical complexity, origin of life or biomolecules, and molecular inheritance throughout star and planet formation, and many others. Planetary Science has benefited greatly from observational platforms whose highest priorities have not originally encompassed the studies of bodies within our solar system. The first measurements of X-rays from giant planet aurorae and comets, the discovery of comet and asteroid dust trails, and the largest surveys of asteroid and comet diameters were the results of observations using assets originally intended for astrophysical studies. The great observatories, Hubble Space Telescope, Spitzer Space Telescope, and Chandra X-ray observatory, have done a comprehensive array of planetary science investigations, and future assets, such as JWST, WFIRST, and next generation space observatories, will make further rich contributions.

The James Webb Space Telescope (JWST) is an infrared-optimized observatory with a 6.5m-diameter segmented primary mirror and instrumentation that provides wavelength coverage of 0.6-28.5 microns, offering unprecedented sensitivity greater than previous or current facilities, and high angular resolution (0.07 arcsec at 2 microns) and low-moderate spectral resolution (R~100-3000) (Gardner et al. 2006, SpSciRev 123, 485; Milam et al. 2016, PASP, 128, 959). It offers multiple capabilities through 4 science instruments including: imaging, spectroscopy (slit, IFU, grism/prism), coronography, and aperture mask interferometry. JWST spectral range covers numerous molecular species in both the gas and solid phase, including the vibrational modes of ices, spectral bands of simple organics relevant to warm/hot exoplanets, and isotopologues. Laboratory studies of such species, various physical and chemical processing that may occur, and even extreme physical conditions relevant to different regions or objects are often time consuming and challenging. Efforts are needed for the analysis and interpretation of the vast datasets that are anticipated from JWST. The Webb telescope is currently scheduled to launch in 2021 and will operate 5+ years after commissioning. This presentation will provide an overview of JWST as well as highlight the unique capabilities and some solar system science planned for this facility the first year of operations. Additionally, I will highlight future missions planned, their capabilities, and potential solar system science that will be enabled through these platforms.

Wednesday, September 12th at 2 pm in Physics LTB