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High Resolution Spectral Measurements of Electrical Propulsion Plasmas MURAT CELIK, OLEG BATISHCHEV, MANUEL MARTINEZ-SANCHEZ, Massachusetts Institute of Technology, SPACE PROPULSION LABORATORY TEAM — Among various diagnostics methods in studying the EP thrusters' plasma, emission spectroscopy provides a non-invasive, fast and economical diagnostics allowing also the ability to access hard to reach locations. This study presents the spectral measurement results of SPT (BHT-200) and TAL (MHT-9) Hall Effect thrusters and mini-Helicon (mHTX@MIT) thruster plasmas. The measurements were conducted using a 750mm focal length spectrometer with a spectral resolution of up to ~ 0.01 nm in the UV-VIS-NIR wavelength range, 200-1000nm. For one set of the measurements, collection optics was placed on a portable optical shelf attached to the window port of the vacuum chamber. For another set of measurements the thruster plasma radiation emission was collected using a collimating lens inside the vacuum chamber and the signal was brought out of the chamber to the spectrometer by the use of UV-rated optical fibers. Accurate spectral characterization was done for Xe and Ar plasma in a broad operational range. Additionally, emission spectroscopy was used to detect line radiation due to wall erosion products in SPT, to study the effect of thruster operational parameters on the ceramic lining erosion rate, subsequently of the thruster's lifetime.

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