AN ULTRAVIOLET SPECTROGRAPH CONCEPT FOR EXPLORING OCEAN WORLDS E. Schindhelm[1], A. Hendrix[2], and B. Fleming[3], [1]Ball Aerospace, 1600 Commerce St, Boulder CO, USA, 80301, eschindh@ball.com; [2]Planetary Science Institute, Tuscon AZ, USA, ahendrix@psi.edu; [3]Laboratory for Atmospheric and Space Physics, Boulder CO, USA, brian.fleming@lasp.colorado.edu

Ultraviolet spectroscopy is a critical element of planetary science missions, enabling the study of both planetary surfaces and atmospheres. UV spectroscopy serves as an excellent complement to infrared spectroscopy and visible imaging because unique molecular absorptions (by atmospheric/plume gases and solid surfaces) and gaseous atomic emissions can be measured exclusively in the UV. Specifically relevant to silicate-water interactions in Ocean Worlds, UV spectroscopy can probe dust/ice composition of the surface or plumes via uniquely identifying features; Hapke modeling parameters constrain surface dust properties[1], while an absorption feature near 1700 Angstroms reveals the presence of water ice[2]. Absorption signatures can identify water vapor via occultations and/or transits.

We present a technology concept for a future planetary science UV multi-object imaging spectrograph, the Ultraviolet Micromirror Imaging Spectrograph (UMIS). UMIS is an integral field spectrograph (IFS) that utilizes digital micromirror arrays (DMAs) and advanced mirror coatings[3] to enable efficient, adaptive target selection in a two-dimensional field-of-view. The large, adaptable UMIS field of view would allow for simultaneous observation of large regions of a plume and surface of an Ocean World, including potentially simultaneous stellar occultations by different regions of the plume. This would enable mapping of the plume, providing large-scale density, composition and dynamical information.

References: [1] Feaga, L. M.; Protopapa, S.; Schindhelm, E.; Stern, S. A.; A'Hearn, M. F.; Bertaux, J.-L.; Feldman, P. D.; Parker, J. Wm.; Steffl, A. J.; Weaver, H. A.. (2015) Astronomy & Astrophysics, Volume 583, id.A27. [2] Steffl, Andrew Joseph; A'Hearn, Michael F.; Bertaux, Jean-Loup; Feaga, Lori M.; Feldman, Paul D.; Noonan, John; Parker, Joel Wm.; Schindhelm, Eric; Stern, S. Alan; Weaver, Harold A.. (2016) American Astronomical Society, DPS meeting #48, id.110.03. [3] Brian Fleming ; Eric Schindhelm ; Emily Witt ; Rachel Tyler ; Kevin France ; Amanda Hendrix ; Arika Egan ; James Wiley (2018) Proc. SPIE. 10545, MOEMS and Miniaturized Systems XVII.