REAL-TIME RADIATION DOSIMETRY REPORTING TO AN EVA ASTRONAUT. Kaden Jeppesen[1], Stephen K. Robinson[1], [1]University of California, Davis (kbjeppesen@ucdavis.edu).

Abstract: Solar system objects such as the Moon, Mars, and near-Earth asteroids are currently under consideration by NASA as strategic destinations for future human exploration missions. Astronauts conducting surface Extravehicular Activities (EVAs) will be operating in a minimally-shielded environment at high risk of physiologically-damaging radiation exposure. Thus, the astronaut should be aware at all times of both the accumulated radiation exposure since the beginning of the EVA and of short-term radiation spikes delivered by solar coronal mass ejections. This research is focused on the integration of radiation sensors and display technology with current and anticipated spacesuit architecture for crew reporting of radiation exposure. The radiation display will be comprised of thin-film electrochromic materials mounted outside the pressurized helmet, either directly on the helmet or on a manually-deployed pull-down sunshade (Figures 1 and 2). A key factor of this display is to provide the necessary data to the suited astronaut in a manner requiring minimal cognitive demand. The desired results of this research are to have a working proof-of-concept of the integrated radiation sensor and display system, and to demonstrate the effective nature of a display that is both informative and non-intrusive.

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References:

(1) Orlando, T. M.; Jones, B.; Paty, C.; Schaible, M. J.; Reynolds, J. R.; First, P. N.; Robinson, S. K.; La Saponara, V.; Beltran, E. Catalyst: Radiation Effects on Volatiles and Exploration of Asteroids and the Lunar Surface. Chem 2018, 4 (1), 8–12.

Figure 1: Extravehicular Mobility Unit (EMU) helmet

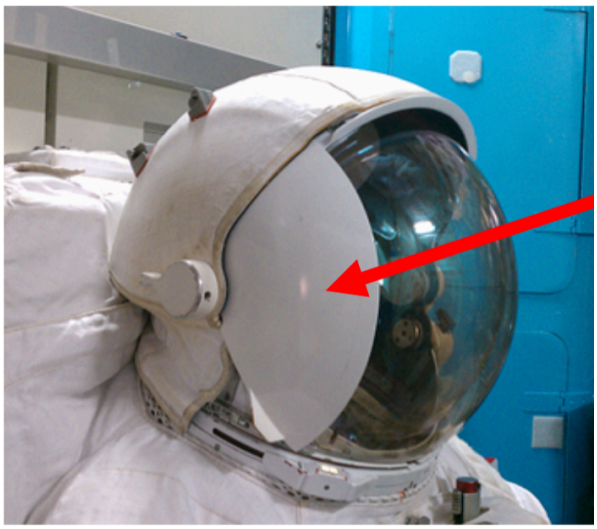

Figure 2: EMU helmet with sunshade pulled down