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Development of the UV LED-Based Charge Management System for the LISA Gravitational Reference Sensor[1] BEN LETSON, SAMANTHA PARRY, MYLES CLARK, TAIWO OLATUNDE, SIMON BARKE, JULIA SCHINDLER, MAURICIO DIAZ ORTIZ, GUIDO MUELLER, University of Florida, TIMOTHY SUMNER, Imperial College London, PETER WASS, University of Florida, MARK STORM, Fibertek, JOHN W. CONKLIN, University of Florida — The LISA observatory, a space based gravitational wave detector, consists of three drag-free spacecraft (SC) flying in an equilateral triangle formation. The SC motion is determined by their inertial reference sensors, which consist of a test mass (TM) in free fall at the level of $\mathrm{fm/s^2/Hz^{1/2}}$ in the mHz band, surrounded by an electrode housing (EH). Due to the charge build-up caused largely by cosmic rays, the LISA TMs will need to be discharged to minimize the effect of electrostatic forces on gravitational wave observations. Contactless discharge can be performed using photoemission under illumination by ultraviolet light with a wavelength around 250 nm. One of NASA's technology contributions to this ESA led mission is the development of a Charge Management Device (CMD) responsible for maintaining a neutral TM potential with respect to its EH. The use of ultraviolet LEDs (UV LEDs) as a light source has many advantages over previously used Hg lamps such as the ability to run them in a pulsed mode that can be synchronized with 100 kHz electric fields around the test mass, as well as low size, weight and power consumption. The status of the LISA CMD hardware development will be presented, as well as some of the initial performance and lifetime testing results from the UV LEDs.

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Ben Letson
University of Florida

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