Abstract Submitted
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A UV LED-Based Charge Management System for the LISA Gravitational Reference Sensor[1] MYLES CLARK, BEN LETSON, SAMANTHA PARRY-KENYON, TAIWO OLATUNDE, SIMON BARKE, GUIDO MUELLER, University of Florida, TIM SUMNER, Imperial College London, PETER WASS, University of Florida, MARK STORM, Fibertek, JOHN CONKLIN, University of Florida, LISA COLLABORATION — The LISA Gravitational Wave (GW) observatory consists of three drag-free Spacecraft (SC) flying in an equilateral triangle formation separated by 2.5 Gm in orbit around the Sun. Motion in each SC is determined by onboard Gravitational Reference Sensors (GRS) consisting of a Test Mass (TM) in free-fall surrounded by an Electrode Housing (EH) fixed to the SC. The GRS isolates the test mass from disturbances at the level of fm/s2/rtHz in the mHz band along the 2.5 Gm arm lengths. Due to charge build-up caused primarily by solar radiation and cosmic rays, stray electrostatic forces will begin to affect the GRS sensitivity and if left unchecked would interrupt GW observations. It is the job of the Charge Management System (CMS) to monitor and mitigate this charge build-up with minimal interruption. To achieve this, the CMS utilises the photoelectric effect to move charges between the gold-coated surfaces of the TM and EH using UV LEDs emitting around 250 nm. To maximise the flexibility of the CMS several modes of operation are being developed. Some are for discharging quickly while violating the sensitivity requirements for GW observation, while others discharge slowly without violation to extend observation windows. CMS operation in these different modes and the performance requirements they impose will be discussed in the presentation.

[1]NASA LISA CMS 80NSSC17K0277

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