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C1Or1A-02: Status of Lockheed Martin Microcryocooler Programs

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There is an increasing need for compact, low-mass, long-life cryocoolers for Earth science, deep space, and astrophysics missions. Packaging a cryocooler within a CubeSat is challenging, and many deep space missions have extreme environmental conditions, such as exposure of "warm" hardware to cryogenic temperatures, and exposure to very high levels of radiation. Lockheed Martin's microcryocooler has a mass of less than 500 grams and is currently the only long-life space cryocooler capable of being packaged within a 1U CubeSat.

This talk will describe the status of several microcryocooler programs at Lockheed Martin's Advanced Technology Center in Palo Alto, California. LM integrated and tested a microcryocooler with a CubeSat instrument, which will be launched alongside the Orion spacecraft on the EM-1 launch vehicle, scheduled for launch in 2020. This CubeSat will take IR images of the moon during a flyby. LM is also building the cryocoolers for the Mapping Imaging Spectrometer for Europa (MISE), an instrument being built by the Jet Propulsion laboratory for the Europa Clipper Mission, and the flight program for this work has begun. LM has recently completed engineering model cryocoolers for a Gamma Ray Spectrometer being built by the Johns Hopkins University Applied Physics Laboratory for the Psyche asteroid mission, and the flight program is expected to begin prior to the 2019 CEC. LM successfully completed a Phase II SBIR with Iris Technology, building and delivering a microcryocooler capable of providing 0.3 W cooling at 35 K while rejecting heat at 150 K.

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