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C4Or1A-02: Status report on the performance of a flight-worthy 4 –10 K Adiabatic Demagnetization Refrigerator for use in a 50 mK to 10 K Continuous Adiabatic Demagnetization Refrigerator

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The cryogenics and fluids branch at NASA's Goddard Space Flight Center is currently developing a high-efficiency, vibration-free, flight-worthy Continuous Adiabatic Demagnetization Refrigerator (CADR) that consist of two modular units: one that lifts ~ 6 microW at 50 mK while rejecting its heat to a 4 K thermal sink, and another unit that provides a constant 4 K cooling stage while rejecting its heat to a thermal sink at 10 K. The two units are linked together via a 4 K common platform. This paper discusses the status report on the thermodynamic performance of the 4 -10 K ADR. This ADR utilizes an Nb₃Sn superconducting magnet and Gadolinium Gallium Garnet (GGG) as its refrigerant. Results show that an idealized cycle, one where its hold time at 4 K is equal to the recycle time, can lift 13 mW at 4 K with a hold time of 132 seconds.

Author: Dr JAHROMI, Amir (NASA - Goddard Space Flight Center)

Co-authors: Dr TUTTLE, James (NASA - Goddard Space Flight Center); Dr CANAVAN, Edgar (NASA - Goddard Space Flight Center); Dr DELEE, Charles (NASA - Goddard Space Flight Center); Dr DIPIRRO, Michael (NASA - Goddard Space Flight Center); Dr KIMBALL, Mark (NASA - Goddard Space Flight Center); Dr SHIRRON, Peter (NASA - Goddard Space Flight Center)

Presenter: Dr JAHROMI, Amir (NASA - Goddard Space Flight Center)

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