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C3Or1A-05 [Invited]: Numerical modeling of a sub-Kelvin Active Magnetic Regenerative Refrigeration Cycle

Wednesday, July 24, 2019 12:00 PM (30 minutes)

Continuous and efficient sub-Kelvin cooling for uninterrupted operation of cutting edge detectors, both in space and on the ground, is critical for top performance in many NASA missions. The development of a sub-Kelvin Active Magnetic Regenerative Refrigerator (AMRR) will provide distributed and continuous sub-K cooling to space instrumentation via circulation of a 3He - 4He mixture. This system will provide substantial advantages over state of the art coolers including reduced mass while maintaining reliable uninterrupted cooling for cryogenic instruments. A key component of the sub-Kelvin AMRR, the Superfluid Magnetic Pump (SMP), has already been developed and tested. To ensure the successful construction of a functional AMRR, a numerical model was developed for use as a design tool to size the regenerators to match the existing SMP. This presentation will highlight the results of parametric studies using the aforementioned model.

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