
SESSION 12: Aerospace Coolers, Drive & Control Electronics

Paper 12.3

Wednesday ORAL Session

3:15 PM

Design of a Low-Noise High-Frequency Miniature Pulse Tube Cooler

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For future missions requiring low-power cooling, Thales Cryogenics and Absolut System are developing a miniature pulse-tube cooler, under ESA contract 4000131162/20/NL/KML.

The objective of this contract is to develop, build, and test an Elegant Breadboard (EBB) model of a miniaturized very high-frequency pulse-tube cooler suitable for the needs of Earth observation missions. More specifically, small sized SWIR/MWIR to TIR missions that require cooling in the 77 K to 120 K temperature range.

The reason for choosing a high drive frequency is to increase the power density of the cooler as well as reducing the impact of exported vibrations at the system level.

The design of the cooler will be presented, including justifications for various design choices.

The manufacturing status of the Elegant Breadboard Model and the results of the initial performance tests will also be discussed. Finally, the planned verification tests will be highlighted.