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C4Or1A-03: 80 K vibration-free cooler for potential future Earth Observation missions

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A solution for a “vibration-free” Joule-Thomson cooler using a sorption compressor is presented to answer the needs of potential future Earth Observation IR missions with low micro-vibration levels requirements from the European Space Agency.

The adopted solution includes a closed cycle J-T cooler, using nitrogen as working fluid with an expected cooling power of 1.5 W @ 80 K. The fluid circulation is achieved by cycles of adsorption/desorption using metal organic framework sorbent materials.

A detailed design and manufacturing of an elegant breadboard model based on the various stringent requirements (temperature range, lifetime, consumption etc.) is shown.

The characterization and validation of the vibration-free cooler components was already carried out: preliminary results and its engineering challenges are presented.

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