



Contribution ID: 8

Type: Poster

## C3Po1F-02: A 100 mW@4.0 K hybrid 4He Joule-Thomson cryocooler for space applications

Wednesday 21 May 2025 09:15 (1h 45m)

The 4He Joule-Thomson cryocooler (JTC) utilizes the JT effect of 4He to typically achieve the temperature of about 4 K. It can be used to cool the detectors with the operating temperature of 4 K and precool the sub-Kelvin refrigerators, which is widely used in space missions such as Astro-H, SPICA, ATHENA, and etc. Based on our laboratory's research, an engineering prototype of the 4He JTC pre-cooled by a two-stage pulse tube cryocooler (PTC) is designed as a pre-cooling stage of the closed-cycle dilution refrigerator. After experiment studies, the 4He JTC successfully obtained a cooling power of 100 mW at 4.0 K with a total input power of 600 W.

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**Session Classification:** C3Po1F - Aerospace Applications II