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C2Or2D-04: Closed Loop He3 JT Stage Performance Demonstration

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To mature the cryocooling system for the Probe far-Infrared Mission for Astrophysics (PRIMA) mission concept, a closed-loop JT stage using flight-like residual hardware from the JWST program was assembled to assess its cooling capacity at 4.5 K. The performance of the JT stage over a range of heat sink temperatures and system pressures was characterized. The paper presents test results without using a DC current to maintain the piston dynamic center position. The maximum allowable piston stroke was determined experimentally to maintain adequate headroom at the piston fore end over the entire expected operating temperature and pressure range. The paper presents the JT stage performances and maximum allowable stroke length with two different passive piston back pressure controls. The measured performance is compared with predicted performance and PRIMA mission required capability.

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