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C1Or3A-01: Performance Optimization of a 4K Hybrid JT Cooler for the HUBS Mission

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A 4K hybrid JT cooler is developed as an alternative to precool the adiabatic demagnetization refrigerator (ADR) of Hot Universe Baryon Surveyor (HUBS) mission which is proposed to study "missing"baryons in the universe. The 4K hybrid JT cooler is composed a 4He JT cooler precooled by a two-stage thermally coupled pulse tube cooler. Recently, the two-stage pulse tube cooler is optimized to provide more precooling power for the JT loop. And both the counter-flow heat exchangers and the evaporator are redesigned to enhance their heat transfer process. Then, improvement measures are conducted on the compression system of the JT loop. Eventually, the performance of the hybrid JT cooler is able to provide sufficient precooling power for the ADR of HUBS. Besides, discussion of the supporting structure of the cold end of the JT cooler is presented in this paper.

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