

Cryocooler Technology Opportunities within Space Exploration

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As the demands for extended space missions and sustained lunar and Martian presence grow, the need for power and mass-efficient cryogenic fluid production and storage becomes paramount. The exploration and advancement of space technologies necessitate the development of innovative cryogenic storage solutions to ensure reliable, long-term production and preservation of cryogenics in space environments for propulsion, life-support, and power applications. This paper covers an analysis of the challenges posed by long-duration cryogen storage and production for in-space and surface applications for NASA's upcoming missions, as well as highlighting cryocooler technology opportunities and gaps to encourage industry stakeholders to contribute innovative solutions to advance the field of cryogenic storage for space applications.