

## HiPTC: a compact, efficient and low vibration cooler for Terahertz detection

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**Abstract**— Since 2010, Air Liquide Advanced Technologies has developed a dual-stage pulse tube cooler for application to future space science missions. The target temperature for this cooler was 15K. The cooler is dubbed HiPTC, standing for Heat intercepted Pulse Tube Cooler.

Tests performed on one engineering model showed that below 9K temperature could be reached using this cooler. This makes it suitable for terahertz detector transition.

Preparatory work has been undergone with Purple Mountain Observatory to adapt the cooler for use in an instrument on board the future Chinese space station. In the frame of this work, a test has been done with coupling of the cooler with a SIS mixer built by PMO. Cryogenic tests have been performed and show very promising results.

The result of this positive testing experience is the availability of a compact, efficient and low vibration cryocooler for terahertz applications. The power consumption of the cooler is less than 500W. Vibration levels are very low thanks to a well balanced compressor and to pulse tube technology. Total cooler mass is below 25 kg including drive electronics and the cooler fits in a reduced volume.

This cooler is particularly well suited for space applications or other mobile application where mass, energy, volume and vibration are key factors.

The presentation will display cooler characteristics as well as test results and will discuss potential applications for this cooler.