TT 32: Cryotechnique

Time: Tuesday 9:30–9:45 Location: HSZ 201

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Efficient countermeasures against the intrinsic temperature oscillations of low vibration 4 K pulse tube cryo-coolers — •Jens Falter[1], Bernd Schmidt[1], Andreas Euler[1], Marc Dietrich[1], André Schirmeisen[1,2], and Günter Thummes[1,2] — [1]TransMIT-Center for Adaptive Cryotechnology and Sensors, Giessen, Germany — [2]Institute of Applied Physics (IAP), Justus-Liebig-University Giessen, Germany

Within the family of regenerative cooling systems, Pulse Tube Coolers (PTC) provide long life operation and low vibrations due to the absence of moving parts inside the cold head. But as a consequence of the periodic compression and expansion cycles of the process gas (He), they exhibit an intrinsic temperature oscillation. Depending on the application, these variations can interfere with the distortion free cooling of detectors and superconducting voltage standards by use of PTCs. If only a low cooling power is needed, those oscillations can be passively damped by a metal plate of low thermal diffusivity. However, this damping fails when high cooling powers are required. Here we present an efficient method for damping the temperature variations which is suitable for applications demanding high cooling power near 4 K. The key component is a small pot located at the cold flange of the cold head. Small amounts of helium gas are precooled and liquefied into the pot. The high specific heat of liquid helium, together with the heat transfer by two-phase flow, allows an effective damping of the temperature oscillation without notable loss of cooling power. This new damping unit is a closed cycle system and maintenance free.