Contribution ID: **978** Type: **Poster Presentation**

C2Po1C-02 [12]: Impact of the cold regenerator meshes geometry on low temperature PT performances

Tuesday 23 July 2019 09:00 (2 hours)

Future astrophysics missions such as SPICA, Athena or LiteBird will need a cooling down below 1 K (until 50 mK) to achieve the detectors required sensibility. To address such requirements, cooling chains are build coupling several technologies using intermediate temperatures cooling.
A high cooling power at 15 K is then essential, so the CEA-SBT designed a Pulse Tube cooler system providing more than 500 mW at 15 K. This PT cooler consists of a heat intercepted single-stage cold finger which, for lab test purpose, is pre-cooled by a Gifford McMahon cryocooler. Its geometry is based on an engineering model which has been tested and qualified, and is being advanced in a separate ESA program involving also our industrial partners Air Liquide AT and Thales Cryogenics BV.
Many studies focus on these regenerators materials, in particular for the cold part which is critical to the PT performances. To complement such investigations, we chose here to keep standard material (stainless steel meshes) and study the influence of the cold regenerator meshes geometry on the operation of the cold finger. The wires diameter is there varying, what modifies the porosity, the dead volume and the heat surface exchange of the cold part.
Experimental results on different meshes designs are presented here and analyzed. The influence of the meshes geometry on the pressure loss, the parasitic heat losses and the performances are then discussed.
This study, together with material regenerator study, will give valuable inputs to improve 15 K cold finger performances.

Authors: Dr DHERBECOURT, Diane (CEA Grenoble); Dr MARTIN, Sylvain (CEA); Dr CHARLES, Ivan (SBT, UMR-E CEA / UJF-Grenoble 1); DUVAL, Jean-Marc (CEA); Mr CHOUPIN, Camille (CEA); ANDRÉ, Jérôme (CNES); DANIEL, Christophe (CNES)

Presenter: Dr DHERBECOURT, Diane (CEA Grenoble)

Session Classification: C2Po1C - Aerospace Cryocooler II