



Contribution ID: 313

Type: **Poster presentation (105min)**

## **Design and Testing of a Two-Stage High Capacity Stirling Cryocooler Operating below 30K**

*Wednesday 9 July 2014 14:15 (1h 45m)*

The high capacity cryocooler working below 30K can be applied in many applications in many fields such as superconducting motors, superconducting power and cryopump. Compared to the GM cryocooler, the Stirling cryocooler can achieve higher efficiency and more compact structure. Because of its obvious advantages, we have designed a two stage free piston Stirling cryocooler system in our laboratory, which is driven by a moving magnet linear compressor with an operating frequency of 40 Hz and a maximum 5 kW input electric power. The first stage of the cryocooler is designed to operate in the liquid nitrogen temperature and output a cooling power of 100 W. And the second stage is expected to simultaneously provide a cooling power of 50 W below the temperature of 30 K. In order to achieve the best system efficiency, a numerical model based on the thermoacoustic model was developed to optimize the system operating and structure parameters. At the same time, the finite element analysis software FLUENT was used to study the heat transfer and flow characteristics. Some preliminary testing results is also given in this paper.

**Author:** Dr WANG, Xiaotao (Key Laboratory of Cryogenics, Technical Institute of Physics and Chemistry of CAS)

**Co-authors:** Prof. LUO, Ercang (Key Laboratory of Cryogenics, Technical Institute of Physics and Chemistry of CAS); Mr LI, Haibing (Lihan Thermoacoustic Technologies (Shenzhen) Co., Ltd); Mr ZHU, Jian (Lihan Thermoacoustic Technologies (Shenzhen) Co., Ltd); Mr CHEN, Shuai (Lihan Thermoacoustic Technologies (Shenzhen) Co., Ltd); Prof. DAI, Wei (Key Laboratory of Cryogenics, Technical Institute of Physics and Chemistry of CAS)

**Presenter:** Dr WANG, Xiaotao (Key Laboratory of Cryogenics, Technical Institute of Physics and Chemistry of CAS)

**Session Classification:** Wed-Af-Posters Session 2.2

**Track Classification:** C-02: Cryocoolers- Pulse tube, Stirling, Magnetic and other coolers