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Aanlysis of the Effect of Natural Convection on Sample Temperature Fluctuation Cooled by GM Cryocooler

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Supercritical helium is often used to reduce the temperature fluctuation caused by the second stage of the G-M cryocooler, however the natural convection of the supercritical helium has a great influence on the suppression of the temperature oscillation.To do experimental research on the effect of natural convection on temperature fluctuation suppression, three different forms of helium pots are designed and fabricated: (1) the barrel of the container is stainless, no copper bar in the container(1# helium pot); (2) the barrel of the helium pot is pure copper, no copper bar in the container(2# helium pot); (3) the barrel of the helium pot is stainless, nineteen copper bar in the container(3# helium pot). By measuring the temperature of the cold head and the bottom of the helium pot change with time, we studied the impact of the helium pressure, the structure of the helium pot, and the heat flux on the temperature fluctuation suppression with the method of fast Fourier transform.

Author: Dr LI, Kongrong (Technical Institute of Physics and Chemistry)

Co-authors: Prof. ZHOU , Gang (Technical Institute of Physics and Chemistry); Prof. LIU, Liqiang (Technical Institute of Physics and Chemistry); Prof. XIONG, Lianyou (Technical Institute of Physics and Chemistry); Dr DONG, Bin (Technical Institute of Physics and Chemistry); Dr PENG, Nan (Technical Institute of Physics and Chemistry); Dr TANG, Jiancheng (Technical Institute of Physics and Chemistry)

Presenter: Dr LI, Kongrong (Technical Institute of Physics and Chemistry)

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