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## Experimental study of one-stage VM cryocooler operating below 8K

The Vuilleumier (VM) refrigerator, known as heat driven refrigerator, is one kind of closed-cycle Stirling type regenerative refrigerator. The VM refrigerator with power being supplied by liquid nitrogen was proposed by Hogen and developed by Y. Zhou, which shows great potential for development below 10K.

This paper describes the design and development of a VM cryocooler operating below 8K. The experimentation was achieved by using liquid nitrogen as a heat sink of middle cavity. The regenerator was optimized by using a part of ceramic magnetic regenerator material Er<sub>3</sub>Ni to replace the lead sphere. The arrangement of regenerative material in the regenerator was also optimized.

Using He<sub>4</sub>, a temperature below 8K has been obtained with a pressure ratio near 1.6, working frequency of 0.8Hz, and charge pressure of 1.8 MPa. The cooling power at 10K is about 500mW.

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