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## A cryocooler used for fixed point at 1.8K

An apparatus is developed to realize the lambda point of helium used as a temperature fixed point. A two-stage Gifford-McMahon (GM) mechanical refrigerator with the cooling power of 1.5W at 4.2K is employed. A closed-cycle of  $4\text{He}$  is used to get the temperature of 1.8K. The helium gas with pressure of 1bar condenses at a pot located the second stage. Then the liquid helium flows into a pump-pot via a flow-resistance-tube and the temperature is down to about 1.8K. A technique of sealed cell was developed to allow a heat flows along the capillary, within which normal and superfluid helium can co-exist and the temperature of the interface is the transition temperature of helium. As the temperature of the pump-pot could be maintained below 2.1K, the plateau of the lambda point of helium could exist for long duration. The temperature fluctuation at the plateau of lambda point of helium could be less than 0.1mK.

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