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## **C1Po1D-03: Simulation and experimental study of ultra-low temperature heat transfer characteristics of continuous heat exchangers in the dilution refrigerator**

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Dilution refrigerators, as the key instruments of quantum research, greatly contribute to the development of quantum computing. Continuous heat exchanger is an indispensable core component in the dilution refrigerator, which precools the incoming concentrated phase by exchanging heat with the return diluted phase. In this study, we propose a thermodynamic model of a continuous heat exchanger considering the factors of flow heat transfer and viscous heat conduction, and analyze the effects of its heat exchanger length, flow rate and inlet pressure on its performance. It is successfully applied to a dilution refrigerator and reaches an outlet temperature of 50 mK, and its system achieved a performance of 380  $\mu$ W at 100 mK cooling capacity. The model proposed in this study can provide a reference for the subsequent research and design of dilution refrigerator and effectively improve its performance.

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