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**A study of temperature control related factors in Vapor cell heating mechanism design for atomic sensor.** TAO XIA, ZHIGUO WANG, YI ZHANG, Interdisciplinary Center of Quantum Information, National University of Defense Technology, RECIPROCAL SOCIETY TEAM — Atomic sensor has become a very promising field of study in developing low cost, high-precision quantum measurement in a compact volume. A vapor cell which contains the working substance is usually a key element for an atomic sensor. It is always necessary to maintain the working substance, such as alkali metal, in gas state with high density. The precision of the sensor is usually closely related to temperature stability and homogeneity of the working substance in the cell. This work studied different heat preservation, heater band or heating power arrangements, and heating rate settings in the cell heating mechanism design. Our study firstly shows that the better heat preservation we have, the better temperature stability we will obtain. It also shows that an appropriate control of power distribution in different heater band is important in ensuring a cold point in the cell, so that the solid state alkali metal will condense near a fixed cold point. And in order to ensure the fixed cold point always has a lower temperature when powering off the system, we should carefully control the heating power decrease for different heater band around the cell. At last, based on our study, we designed an optimized heating mechanism for atomic sensor implementation in the future.

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