

Frequency change of Torsional oscillator induced by solid ^4He in torsion rod

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The contribution of the solid ^4He in the torsion rod to the resonance frequency of the torsional oscillator(TO) was investigated. The origin of the frequency increase of TO below ~ 0.2 K with solid ^4He is still unclear. In the conventional TO's setup, ^4He is supplied to the oscillator's body through a hole located at the center of the torsion rod. In the previous studies, the frequency increase has been regarded to be caused by the decrease of the rotational momentum inertia (I) of solid ^4He in the torsion body. However, the spring constant (K) of TO may be affected by the solid in the torsion rod [1]. To measure the contribution from the solid in the torsion rod, we constructed two different TOs, one is the cylindrical conventional TO which includes the solid in the body and in the torsion rod, and another one includes the solid only in the torsion rod. By comparing the results from the two setups, the contribution of the solid in the torsion rod to the frequency change was estimated.

The experiment was performed in ISSP as joint research.

[1]. J. Beamish *et al.*, Phys. Rev. B, 85, 180501 (2012).

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