

Nature of the Quantum Oscillation of Solid ^4He under DC Rotation

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Recent our finding of quantum oscillation in solid ^4He under DC rotation, in which "Non-classical Rotational Inertia (NCRI)" oscillates as a function of inverse angular velocity Ω^{-1} can be possible evidence of supersolidity. Because it is genuine quantum phenomena in solid ^4He such as "de Haars-van Alphen" effect in fermionic matter. This rotating result is hard to explain by change in elasticity of solid. The cell used at the previous experiment contained not only annular Vycor but also unexpected small bulk space. We observed enhancement of NCRI and stabilizing of quantum oscillation when using solid made above 5.6 MPa. By contrast, NCRI reduces and the quantum oscillation vanishes at 2.8 MPa at which no solid forms in Vycor. We suppose that composite of bulk solid and solid in Vycor, both "super" solid, is a key role of the oscillation. This hypothesis, however, disagrees with a recent claim that no NCRI was observed in solid confined in Vycor[1]. Revealing the nature of quantum oscillation of solid ^4He , we prepare DC rotation experiment with new torsional oscillator containing annular Vycor which rule out bulk space.

1. D.Y.Kim and M.H.W.Chan, Phys. Rev. Lett. **109** 155301 (2012).

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