

Physics of Quantum Solid in Microgravity

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Abstract

Here we review several interesting and important physics aspect of solid ^4He in microgravity. Solid ^4He is produced at low temperature by applying an external pressure of about 25 bar on superfluid. Due to almost no latent heat involved in the phase transition and the rapid mass transfer in superfluid, the growth coefficient of solid ^4He is enormous. This fact enables us to study the true equilibrium crystal shape, which cannot be done with any other material. Thus, solid ^4He at low temperature is the ideal system to study the fundamental physics of a crystal: equilibrium crystal shape, roughening transition, quantum surface physics, etc. Unfortunately solid ^4He is strongly affected by the Earth's gravity, so that the ultimate study must be done in microgravity. A possible way these experiments can be performed on the ground is proposed.