

Study of the Free Surface Property of Superfluid He under Rotation

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One of the distinguishing features of superfluid He is the existence of the quantized circulation. When superfluid in a cylindrical container rotates faster than the critical angular velocity, a triangular lattice of quantized vortices forms. Many extensive study of the property of the quantum vortex (QV) has been done, nevertheless, the detail properties of the free surface with QV have yet to be definitively determined.

In this experiment, surface state electrons (SSE) are employed as a probe, which is known to be an excellent probe for studying the free surface at rest [1]. In the figure 1, temperature dependence of the mobility ($\mu(T)$) on superfluid ^4He at rest is shown. The main scatter is indicated above the graph. Each scattering process is well understood by both experimentally and theoretically [1]. On the other hand, at the rotating superfluid surface, both hollow and core of the QV is supposed to act as some sort of scatter for SSE. In addition, the density of the QV can be controlled easily. Consequently, the surface property under rotation can be understood through the study of the transport property of SSE on rotating superfluid He.

In this presentation, more detail of the measurement method, some preliminary results and future plan will be presented.

[1] *Two-Dimensional Electrons System on Liquid Helium and Other Substrates* edited by E. Y. Andrei, Kluwer Academic Press, New York, 1997

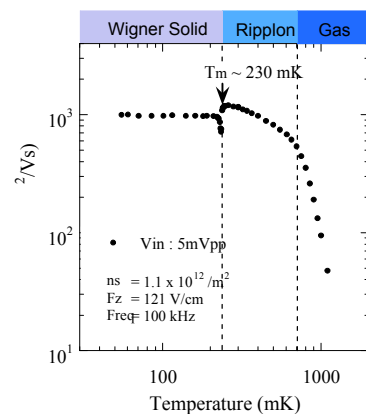


FIG.1: Temperature dependence of mobility of SSE at rest