The objective of the Low-Temperature Physics Group

Institute for Materials Research (IMR) introduced a helium liquefier in 1947, which was the first helium liquefier in Japan. This was the beginning of contemporary low-temperature physics with the use of liquid helium in Japan. Since then, the IMR has played a leading role in the Japanese research of low-temperature condensed matter physics, in particular, quantum transport, superconductivity, and novel magnetism, and its core research division was the Low-Temperature Physics Group (LTPG). Recently, the LTPG has contributed to topological condensed matter physics.

At low temperatures, physical properties in matters such as magnetism and electronic transport show their quantum nature. Particularly, in a certain class of materials denoted as quantum materials, the novel quantum properties emerge conspicuously at low temperatures. Therefore, the systematic measurement at low temperatures is indispensable to understand the mechanism. In addition, quantum technologies such as quantum computing have attracted much attention recently. Thus, the quantum condensed matter physics at low temperatures is thought to be important even in light of the basis of quantum technology. The research field is quite wide, which includes all the quantum properties at low temperatures exemplified by superconductivity, quantum magnetism, topological properties, and the materials showing them.

The role of LTPG is to do high-quality experimental research of quantum condensed matter physics with original techniques, methods, materials, and/or devices, leading the research field. For the cooperative graduate school, the Graduate School of Science, Department of Physics, or the Graduate School of Engineering, Department of Applied Physics, is preferred.

In addition, LTPG needs to contribute to the management of the Center for Low-Temperature Science, Tohoku University, and the Laboratory of Low-Temperature Materials Science, IMR.