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Magnetic Field Shielding with Superconductors

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Magnetic fields occupy an important position in many physics studies, and control of minute magnetic fields is important for measurement items in many physics experiments. Superconducting accelerating cavities can generate high electric fields with a small amount of high frequency power. However, the material niobium is a type-II superconductor, which traps the environmental magnetic flux in the material during the superconducting transition, resulting in loss during operation. Shielding from a weak magnetic field is essential. However, high magnetic permeability magnetic materials for very low temperatures are expensive, not easy to handle, and increase costs. Therefore, we are proceeding with research focusing on magnetic shields that utilize the diamagnetism of superconducting materials, rather than the magnetic flux absorption phenomenon caused by high magnetic permeability materials.

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