

Measurement of magnetic shielding performance and permeability of soft magnetic alloys for SRF

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Magnetic shield products are manufactured through specialized processes, including heat treatment and performance testing of DC magnetic shielding. By May 2018, all of the magnetic shields for the SRF of the FRIB were completed and passed performance tests at room temperature in our factory. Those products are made of mu-metal, a nickel-iron alloy, instead of from an alloy for cryogenic temperatures. Heat treatment was done at 1100 degrees Celsius with a hydrogen gas atmosphere, and the permeability of the mu-metal increased by about 100 times larger than that of the raw material. In the final process, the performance of each product was tested in a 40-50 uT DC magnetic field. The shielding factors were calculated from magnetic field strengths measured by a magnetometer, which is carefully calibrated. The talk will also discuss the behavior of permeability at several levels of cryogenic temperature for farther understanding of shielding performance at 4.2, 25, 50, 100, and 200K.

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