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Repetitive irradiation tests at cryogenic temperature by neutrons and protons on stabilizer materials of superconductor

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Superconducting magnets for high-intensity accelerators and secondary particle sources are being required to operate in the high radiation environment by beam collisions and beam losses. Neutron fluence in the high-luminosity LHC and the COMET experiment is expected to exceed 10^{21} n/m^2. The stabilizer of superconductor is made of pure copper and aluminum and should degrade by such high radiation. Series of irradiation tests were accomplished to evaluate the degradation at cryogenic temperature. The effect of repetitive cycles of irradiation at cryogenic temperature and anneal at room temperature on stabilizer materials of copper and aluminum were measured using reactor neutrons at KUR. Also, pure metals are irradiated at cryogenic temperature by high-energy protons at J-PARC. This paper will review the results of repetitive irradiation tests on copper and aluminum with reactor neutrons and accelerator protons.

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