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Infulence of neutron irradiation on conduction cooling superconducting magnets

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The conduction cooling superconducting magnets are now widely used in various application because of their minimum usage of helium. In the accelerator science field, they are also widely used for particle detector solenoids because they can minimize the materials needed for the magnet such that they can be more transparent against irradiated particles. For the same reason they are now used at irradiation environments because they can reduce the heat load due to the irradiation. However, the hadronic irradiation, such as neutron irradiation, can degrade thermal conductivity of pure aluminum that are used as thermal conductor. This leads to a pure cooling condition of the magnets. At J-PARC, there are two conduction cooling superconducting magnets; one is already built and under operation, the other is now under construction. The paper reports the influence of the neutron irradiation on those magnets, and discuss the possibilities of HTS based conduction cooling magnets under high irradiation environments.

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