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Equipment protection system against unexpected abnormalities during high-intensity proton beam operation at J-PARC MR

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The J-PARC MR synchrotron began high repetition operation with shortened accelerator cycles in 2022. So far, FX has been supplying a 2×10^{14} proton per pulse (ppp) beam to the Neutrino Experimental Facility with a repetition rate of 1.36 seconds, and SX has been supplying a 0.6×10^{14} ppp beam to the Hadron Experimental Facility with a 5.20 seconds repetition. The amount of heat per accelerated proton beam pulse exceeds 1 MJ, and it is an important issue to avoid damage to the equipment caused by high-intense beam due to abnormalities during beam acceleration. Since the MR is operated in different extraction modes, i.e. FX and SX, the countermeasures are also different, and the adequate protection system also needs to be considered, respectively. Therefore, the countermeasures have been put in place, including a high-speed beam abort system and/or a fast sequential interlock between devices. This report summarizes the systems to protect equipment from abnormalities that unexpectedly occur during high-intensity proton beam acceleration.

Footnotes

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LaTeX

Region represented

Asia

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