



Contribution ID: 1871 Contribution code: TUPM105

Type: **Poster Presentation**

## **Impact of slow-extracted beam by main power supply trip in J-PARC main ring**

*Tuesday, 9 May 2023 16:30 (2 hours)*

J-PARC Main Ring delivers 65 kW ( $7 \times 10^{13}$  ppp) slow-extracted beam over 2 sec. at 30GeV to the hadron experimental hall to drive various nuclear and particle physics (hadron) experiments. Unexpected behavior of the high-intensity beam caused by the accelerator trip could cause serious machine damage. In March 2021, the first electrostatic septum (ESS1) was broken by a bump orbit distortion caused by the quadrupole field decrease by the trip of a vacuum circuit breaker for the quadrupole power supplies in the straight section. The slow extraction operation was resumed after replacing the ESS with a spare one and shortening the decreasing time of the slow bump power supplies triggered by the trip signal. In the long shutdown after the run, the power supplies for the main magnets have been upgraded for a higher cycle operation for the neutrino oscillation and the hadron hall experiments. The impact of the slow-extracted beam by the new main power supply trip has been investigated by the beam simulation. The simulation showed that each trip of defocusing quadrupole and bending families could deliver a short-pulsed beam and break a gold production target in the hadron hall. The mechanism forming the short-pulsed beam and the countermeasure will be also reported in this paper.

### **Funding Agency**

### **Footnotes**

### **I have read and accept the Privacy Policy Statement**

Yes

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**Session Classification:** Tuesday Poster Session

**Track Classification:** MC4: Hadron Accelerators: MC4.T12: Beam Injection/Extraction and Transport