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J-PARC neutrino beamline upgrades towards 1.3 MW beam power for long baseline neutrino oscillation experiments in Japan

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Realization of high intensity neutrino beam over 1 MW beam power is crucial to search for CP violation in lepton sector. J-PARC Main Ring (MR) accelerator and neutrino beamline are being upgraded toward 1.3 MW beam power for Hyper-Kamiokande experiment, a future long baseline neutrino oscillation experiment in Japan, by shortening repetition cycle (2.48 to 1.16s) and increasing beam intensity (2.6x10^14 to 3.2x10^14 protons per pulse).
During long shutdown in 2021 and 2022, neutrino beamline DAQ and control system have been upgraded for the shorter cycle and magnetic horn system has also been upgraded for higher current operation (250 to 320 kA).
MR and neutrino beamline operation was resumed in 2023 after the long shutdown. The magnetic horn system is successfully being operated at 320 kA for physics running, which enables 10% more neutrinos at the far neutrino detector. The stable operation of MR and neutrino beamline was achieved at 800 kW so far. Further upgrades of MR and neutrino beamline are ongoing to achieve 1.3 MW beam by 2028.
In this presentation, operation experience of the neutrino beamline, and status and prospect of the beamline upgrades are presented.

Footnotes

Paper preparation format

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