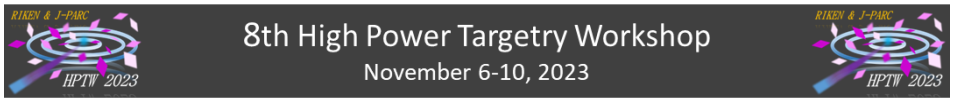

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Updates on the operation of the MLF neutron target at J-PARC and perspectives for future operation

Thursday, 9 November 2023 09:00 (30 minutes)

The high-power pulsed spallation neutron source at Materials and Life Science Experimental Facility (MLF) in the Japan Proton Accelerator Research Complex (J-PARC) started the operation in May 2008, and now it is used as one of the most powerful facilities in the world for the research in the advanced field of material and life science. The beam power for user program is decided to secure the stable operation for long period of scheduled time and that had been raised stepwise every year. In April 2023, the user program resumed after a short outage with the beam power of 840 kW at MLF, which was comparable with that attained in May 2022, but this time the pulse intensity was raised to the highest record of 950 kW for the first time for long term user operation. The pulse intensity corresponds to the beam power at the 3GeV rapid cycle synchrotron (RCS) outlet and is the dominant factor of the pitting damage of the mercury target vessel by pressure waves. This accomplishment means that the goal of the stable operation of the neutron source with 1 MW was almost achieved.

Since the proton beam pulses at RCS outlet are shared between MLF and 30GeV main ring (MR), the beam power at MLF becomes smaller than that at RCS outlet and is changed in accordance with the operation mode of MR. The minimum beam share of MLF is 88.2 % at present and it is planned to be reduced to 86.2 % from 2028, which means that the beam power at MLF is 862 kW even when the power at RCS outlet is 1 MW. In order to achieve 1 MW operation at MLF, the pulse intensity needs to be increased to 1.16 MW, and the mercury target should endure the pulse intensity higher than 1 MW.

In addition to pursuing the higher power operation, there are other requirements to cope with the serious issues of storage space and disposal of the highly radioactivated used target vessels. Now R&D of the mercury target vessel is going on to realize two countermeasures, that is, extending the target operation time and reducing the volume of the used target vessel. Extension of the target operation time with higher power needs a target vessel capable of more effective pitting damage mitigation. Volume reduction of a target vessel needs a new target design which can be disassembled by present remote-handling tools after the beam operation.

In this presentation, present status of the neutron source of MLF and future operation plan will be shown.

Themes for the contribution

7 Operation of targets and beam dumps:

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