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Status and upgrade plan of Linac and RCS in J-PARC

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In J-PARC, a 3 GeV proton beam, which is accelerated by the 400 MeV Linac and the following Rapid Cycling Synchrotron (RCS), is provided to a neutron source in the Material & Life Science Experimental Facility (MLF). The beam with a power of 500 kW has been stably provided to the MLF for the past year. High availability of 94 % during the MLF user operation was achieved in the fiscal year of 2018 with a 4129 hours operation time. Many efforts to reduce downtime causes have been performed such as rejection of undesirable large signals of the beam loss monitors by optimizing a time constant in the circuit, and suppression of discharge trips in the RFQ by vacuum pressure improvement, etc.

In addition, trial operations at 1 MW were achieved for 1 hour in July 2018 and 10.5 hours in July 2019. Although the beam was stopped several times during the 1-hour test in 2018 by beam loss signals due to vacuum pressure increase in the RCS, the number of beam stops during 10.5 hours in 2019 was only 3 times because of enough vacuum aging.

In response to the prospect of continuous operation of 1 MW, the accelerator group has begun to consider upgrades for the future operation with more than 1 MW beam power, such as an improvement of the Medium Energy Beam Transport 1 (MEBT1) for optimal beam matching between the RFQ and the DTL, a remodeling of the RCS injection magnets and vacuum chambers to install enough radiation shield materials, and a reinforcement of the RF system in the RCS.

In this presentation, summary of the current status and upgrade plans for higher beam power operation of the Linac and the RCS will be described.

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