

Upgrade and Operation of J-PARC Linac

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J-PARC accelerator consists of a linac, a 3 GeV Rapid Cycling Synchrotron (RCS), a 30 GeV Main Ring synchrotron (MR) and three experimental facilities. The linac had been operated with a beam energy of 181 MeV and a regular peak beam current of 15-20 mA for user operation. A full energy (400 MeV) and higher peak beam current (50 mA) linac is required for J-PARC to reach the nominal performance of 1 MW at RCS and 0.75 MW at MR. For the beam energy upgrade, we installed a new accelerating structure ACS (Annular-ring Coupled Structure). We also need to increase a peak beam current by replacing the front end.

The beam commissioning of the linac with the ACS was started in December 2013. The designed beam energy of 400 MeV was achieved in January 2014 followed by the beam commissioning of the RCS. In the accelerator study, the RCS demonstrated the high beam intensity of 560 kW, which is the similar level before the energy upgrade. The user operation of the Materials and Life Science Experimental Facility (MLF) was resumed on February 17, 2014 with the beam power of 300 kW. During the user operation, we have suffered from some failures and troubles; instability of cooling water flow level, discharge of a klystron, malfunction of high voltage power supply, etc. For the beam current upgrade, we have a plan to replace the ion source and the Radio Frequency Quadrupole linac (RFQ) during the summer shutdown of 2014. A test stand has been constructed to perform the beam test before installation. The acceleration test of the RFQ was started in December 2013 and acceleration of 50 mA peak beam current was successfully demonstrated in February 2014. The upgrade and operation experience of the linac will be presented.