

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



MLF, MR

section

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J-PARC accelerators





Beam power history

Jul. 2019: 1MW Jul. 2019: 1MW

Accelerator availability: JFY2018

LINAC/RCS Tuning,

Startup, etc.(1),

Residual dose

Maintenance day during 500 kW user operation for MLF



1 MW beam demonstration



Jul. 2018

Although a turbomolecular pump in RCS was troubled, the pressure had been kept in the low 10⁻⁶ Pa range without beam. However, with beam ...





<u>Jul. 2019</u> Very stable 1MW operation was demonstrated.



Single shot 1 MW eq. beam was achieved with no beam loss



Ionization of gas by beam Ion induced gas desorption =pressure increase

Upgrade plan of the Linac and the RCS



Countermeasure to anode current limit of RCS RF PS

Recipes for beyond 1 MW

□ MEBT1 lattice optimization

Current issue:

- 2 bunchers for 3 parameters optimization
- Transverse focus for the beam chopper
- Energy & longitudinal matching for the DTL
- •Upgrade: additional 3rd buncher ✓ **Buncher-1:** upstream of the chopper ➢ Beam loss reduction in the RCS ✓ **Buncher-2**, **3**: upstream of the DTL Beam loss reduction in downstream



□ Reduction of RCS kicker impedance effect

Current issue: beam instability by the induced current by the beam reflected by PS

- Solution by beam optics
- proper manipulation of the tune
- \checkmark reduction of chromaticity correction.
- Successfully accomplished 1 MW



Solution by hardware

1 diodes & resistor to dump the \checkmark induced current



□ Radiation shield in the beam injection area in RCS

Current issue: little space for shield in injection area exposed to high radiation



Current issue:



The output current of an anode power supply has reached the limit for higher power beam acc.

- Increase the output current of the anode power supply Add the inverter units as possible as allowable space Unit number: $15 \rightarrow 19$ Done in 2017 Max acceptance current: $125 \rightarrow 157$ A
- Reduce the required current for the anode power supply

Reduce the number of acceleration electrodes + single ended cavity structure





•1st foil chamber: •length "390 mm \rightarrow 710 mm" •cross-sectional shape "circle \rightarrow rectangle"

(SB1&4 remain split)

