RILAC operation

H. Yamauchi,[*1] M. Fujimaki,[*2] N. Fukunishi,[*2] H. Hasebe,[*2] Y. Higurashi,[*2] E. Ikezawa,[*2] H. Imao,[*2] O. Kamigaito,[*2] K. Kaneko,[*1] M. Kidera,[*2] M. Komiyama,[*2] R. Koyama,[*1] K. Kumagai,[*2] T. Maie,[*2] T. Nagatomo,[*2] T. Nakagawa,[*2] T. Nishi,[*2] T. Ohki,[*1] J. Ohnishi,[*2] H. Okuno,[*2] K. Oyamada,[*1] K. Ozeki,[*2] N. Sakamoto,[*2] K. Suda,[*2] J. Suzuki,[*1] M. Tamura,[*1] A. Uchiyama,[*2] S. Watanabe,[*2] T. Watanabe,[*2] Y. Watanabe,[*2] K. Yamada,[*2] and A. Yusa[*1]

We report on RILAC operations in 2022. Beam service started in January 2021, and is frequently interrupted due to high X-rays from the first and last cryomodules (CM1, CM3) of SRILAC.[1] These X-rays were caused by field emission from the cavities and have been handled by changing the balance of the acceleration voltage. To improve the condition of cavities, we applied pulsed high-power radio-frequency (RF) processing in November and successfully reduced the field emissions. The beam service was restarted in December and continued up to the present. Some statistical data regarding the RILAC operation from January 1st to December 31st, 2022, are provided in Table 1.

Table 1. Statistical data of RILAC operation from January 1st to December 31st, 2022.

Operation time of RILAC	3856.9	h
Mechanical problems	27.0	h
Standalone RILAC	3352.5	h
Injection into RRC	0.0	h
Total beam service time of RILAC	3352.5	h

During the summer maintenance period, we updated the RF control panel for the RILAC injector system, and all the RF systems at RILAC can now be operated remotely. Other maintenance works performed during the reporting period are listed below.

(1) Replacement of TMPs for tank #5, coupler of middle cryomodule of SRILAC (CM2) and RFQ.
(2) Replacement of power supplies for transistor amp. of tank #1, auto gain controller of A1 and A2, and filament of tank #5.
(3) Parallelization of cooling water lines for vacuum pump of tank #5, #6 .
(4) Renewal of chillers for INCAP in tank #1, #2, #5, #6.
(5) Installation of Direct-Current Current Transformer (DCCT) for power supplies of steerer magnets in High Energy Beam Transport line.
(6) Replacement of valves and joints of cooling system for A1, A2 cavities from brass to stainless steel.
(7) Repairment of vacuum leakage in tank #2 and A1 cavity.

We encountered several machine troubles during the reporting beam service period, which are listed as follows.

(1) Repairment of water leakage from the middle stage amp. of tank #6 and end drift tube of A1 cavity.
(2) Malfunction and repairment of the power supply for D2 magnet.
(3) Malfunction and replacement of Auto Phase Control (APC) system of tank #3, power supplies for middle and end stage filament, PLC unit of A2 cavity and wide band amp. of tank #1.
(4) Malfunction and repairment of DC24V control unit and remote switch for APC of tank #4.
(5) Falling the profile monitor at e12 into beam line by the trouble of the cylinder.
(6) Thermo-senser trouble of RFQ.
(7) Vacuum deterioration at G3DP by lack of rotary pump oil.
(8) Trouble and re-calibration of OUTCAP position monitor of tank #6.

All the problems were successfully fixed, and the beam service was recovered instantly. The RF system became more stable owing to the temperature control operation of the second-stage cooling system introduced last year.[2]

*1 SHI Accelerator Service Ltd.
*2 RIKEN Nishina Center

References

1) N. Sakamoto *et al.*, Proc. SRF2019, (paper WETEB1, Dresden, 2019), p. 750.
2) K. Yamada *et al.*, in this report.