RILAC operation

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The RIKEN heavy-ion linac (RILAC) has operated steadily throughout the reporting period and has supplied various ion beams for different experiments. Some statistics regarding the RILAC operation from January 1 to December 31, 2015 are given in Table 1. The total beam service time of the RILAC accounted for 85.8% of its operation time. The two operation modes of the RILAC, the standalone mode and the injection mode, in which the beam is injected into the RIKEN Ring Cyclotron (RRC), accounted for 73.8% and 26.2% of the total beam service time of the RILAC, respectively. For beam experiments and machine study of the RI Beam Factory (RIBF), a 2.675-MeV/nucleon ^{48}Ca-ion beam accelerated by the RILAC was injected into the RRC from November 14 to December 4. Table 2 lists the beam service times in the standalone mode of the RILAC allotted to the e2 and e3 beam courses in target room no. 1 in 2015. The e2 beam course was used in experiments with the GARIS2. The e3 beam course was used in experiments with the GARIS. Table 3 lists the operation time of the 18-GHz ECR ion source in 2015.

We carried out the following improvements and overhauls during the reporting period.

1) In the RF systems, the DC high-voltage power supplies were subjected to annual inspection. The major components of mechanical parts were subjected to simple inspection.
2) Three water pumps were overhauled. The other water pumps were subjected to simple inspection. All cooling towers were subjected to monthly inspection and annual cleaning. In addition, bearings for the fans and the fan motors of the cooling towers for rf systems and the cavities of the RILAC and the CSM were replaced with new ones.
3) All the turbomolecular pumps were subjected to annual inspection. Cryogenic pumps used for the RILAC no. 6 cavity and the CSM A4 cavity were overhauled.

We faced the following mechanical problems during the reporting period.

1) The contact fingers of the direct current blocker for the final vacuum tube of the RILAC no. 6 rf system had melted because of the excessive rf current. We replaced it with a new one.
2) The final vacuum tube of the FC-RFQ rf system had a problem. We replaced it with a new one.
3) Water was found to have splashed in the stem of the FC-RFQ cavity and the stub of the x-rebuncher because of leakage from each cooling pipe joint. We replaced it with a new one.
4) Water was found to have splashed in the 5 kW dummy load resistance of the RILAC no. 4 rf system and the end drift tube of the CSM A6 cavity because of leakage from each cooling pipe. We repaired the pipes with a repair material as a stopgap measure.

Table 1. Statistics of RILAC operation from January 1 to December 31, 2015.

Operation time of RILAC	3255.9	h
Mechanical problems	22.0	h
Standalone RILAC	2063.6	h
Injection into RRC	731.5	h
Total beam service time of RILAC	2795.1	h

Table 2. Beam service time of the standalone RILAC allotted to each beam course in target room no. 1 in 2015.

Beam course	Total time (h)	%
e2	583.7	28.3
e3	1479.9	71.7
Total	2063.6	100.0

Table 3. Operation time of the 18-GHz ECR ion source in 2015.

Ion	Mass	Charge state	Total time (h)
He	4	2	72.0
N	14	3	83.9
Na	23	7	466.6
Mg	24	7	264.0
Ar	40	11	477.6
Ca	48	10,11	1665.5
Ti	48	11	92.6
Ti	50	11	157.4
Kr	82	18	576.0
Kr	86	11	72.0
Total			3927.6

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