MACHINE OPERATION

In 1998, the SPring-8 storage ring was stably operated in two- or three-week modes for one cycle. The total operation time of the storage ring was 4190 hours. Within this operation time, 2624 hours (62.6%) had been provided to the users and 110 hours (2.6%) was loss time due to failures of machines and beamlines. The most significant failure in 1998 was the breakdown of the power supply of sextupole magnets which caused loss time of 15 hours. The remaining 1456 hours were used for the tuning and study of accelerators (Linac, synchrotron and storage ring) and beamlines, and for the commissioning of new beamlines.

The filling modes in the user time are shown in Figure 1. A 62.3% of the total user time was operated in multi-bunch mode, as full filling mode or 2/3 filling mode, and the remaining time was several-bunch mode, such as a 21-bunch mode (21 equally spaced trains of 3 or 7 bunches) with a total current of 70 mA, 10-bunches + partial filling and so on. A current of 0.5 or 1 mA/bunch was stored, and the purity was better than 10^{-6} in the user operation. Also, the current /bunch was stored until 12 mA without observing any beam instability in a machine study, and the bunch current was limited by decreasing vacuum pressure due to heating of the bellows port.

The beam lifetime depends strongly on these filling modes. The lifetime at a total current of 70 mA for full filling mode is about 90 hours, and that for several-bunch mode with 1mA/bunch is less than 6 hours when the insertion device's (ID) gap was fully opened and about 15-20 hours when the ID gap was closed (in user-service mode). It appeared that the increase in lifetime was due to the very weak skew component in the ID. The electron beam was refilled or accumulated at a repetition of once or twice a day.

Furthermore, service of a 1 GeV electron beam to the New SUBARU ring was started from September 1998 as a parasite mode of the Linac operation. The New SUBARU ring is a 1.5 GeV synchrotron/storage ring built by the Himeji Institute of Technology for their synchrotron radiation use. At present, a current of about 10 mA can be stored with a lifetime of several minutes, and irradiation of the chamber surface by the photon beam is now being studied to improve the lifetime.

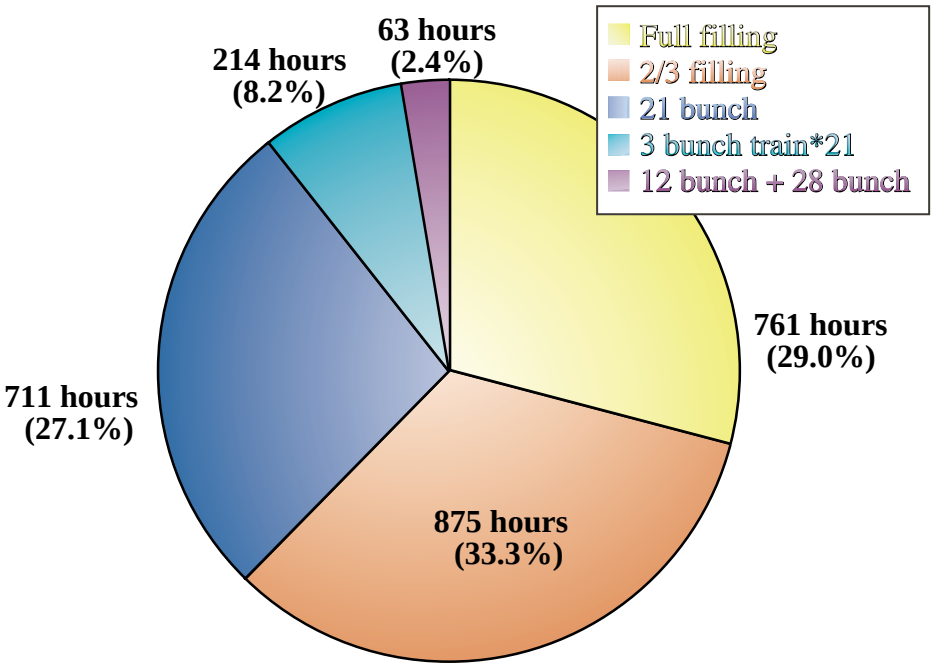

Figure 1: Filling modes during user time in 1998.