

Accelerator Division

- General -

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SPring-8 (Super Photon ring-8 GeV) is the facility of "a third generation" synchrotron radiation source in the X-ray region. The accelerator system consists of an injector linac of 1.2GeV, a booster synchrotron of 8GeV and a storage ring with a natural emittance of 5.5nmrad. The fabrication and integrated tuning of the accelerator system completed successfully during FY 1996. The beam commissioning was started on August 1, 1996 for the linac, October 10 for the booster synchrotron and March 14, 1997 for the storage ring. On March 25, 1997, we succeeded to get the stored current of 0.05mA with about 10 hours lifetime in the storage ring.

Also, the feasibility study on the laser Compton back-scattering in the 8 GeV storage ring and the design of the experimental apparatus were carried out. Furthermore, a quasi-isochronous storage ring (New Subaru), an ultra small emittance ring and a single pass FEL(SASE) using the injector linac were investigated as a candidate of the fourth generation light source.

-Linac-

The integrated turning of the linac system were made progress early in 1996. The aging of the accelerator column and wave guides was carried out by using an automated aging system controlled by a computer, whose system attained a maximum rf power in 550 hours. On August 1, the beam commissioning had been started and on August 8, the electron beam was accelerated up to the maximum energy of 1.2 GeV. This beam commissioning was carried out until the end of December, and the electron beam was extracted to the 8GeV booster synchrotron.

-Synchrotron-

All the components, such as magnets, rf cavities, vacuum chambers, beam position monitors etc, of the 8 GeV booster synchrotron were installed in the tunnel by the end of March 1996. The integrated tuning was started from April 1996 and completed successfully by the end of 1996. The beam commissioning was started on December 10, 1996. On December 16, 1996, the electron beam was accelerated up to 8GeV, and extracted to a beam dump on January 27, 1997. The final test of the safety system in the synchrotron was done in February, 1997.

-Storage Ring-

The construction of the storage ring was almost finished and the integrated tuning completed successfully by the end of February, 1997. Main magnets (88 bending, 480 quadrupole and 336 sextuple magnets) were finally aligned with the high position accuracy within $\pm 25\mu\text{m}$ and injection magnets (3 septum magnets and 4 bump magnets) and 569 steering magnets were installed in the storage ring tunnel. The fabrication of 16 rf cavities was finished and the rf high power test was carried out for the individual cavity. After the test, those cavities were installed in two rf stations and the cavity conditioning was made progress at the maximum rf power of 100kW/cavity. The installation of the vacuum system, the baking test at 150°C, the activation of NEG and the evacuation completed successfully in September 1996, and the vacuum pressure below 10nPa was achieved.