LIGHT SOURCE

& BEAMLINES

Single Bunch Operation at the UVSOR Storage Ring

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The single bunch beam is routinely supplied for time resolved experiments at the UVSOR facility at a rate of one week in two months. Efforts have been made to improve the quality of the single bunch beam.[1,2)]

To measure electron populations of the bunches in the single bunch mode operation, a photon counting system is used. The measured impurity just after the injection is less than $1\mathrm{X}10^{-3}$, which is a ratio of a population of electrons in an unwanted bunch to that in the main bunch. It was found that the impurity gradually increased with the passage of time after injection and that it reached an order of magnitude larger value than an initial one in five hours.[3)] This increase is not only in the ratio but also in the absolute number, which means that electrons lost from the main bunch are re-captured in the other bunches. To cure the impurity increase, a beam scraper was installed at the non-zero dispersion section in the storage ring. It completely suppresses the growth of the impurity population in the single bunch mode.[4)]

So far, the maximum stored current at the injection energy of 600 MeV is 93 mA, and an initial current of 60 ∿ 70 mA is supplied for users at 750 MeV.

REFERENCES

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2) T. Kasuga, M. Hasumoto, T. Kinoshita and H. Yonehara: Proc. 6th Symp. on Accelerator Sci. Tech. (Ionic, Tokyo, 1987) p.195.
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Construction of a Superconducting Wiggler

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A new superconducting wiggler was constructed and installed in the UVSOR ring instead of the old one. It has three poles and the maximum magnetic field at the central pole is 4 T. These specifications are the same as the old one. However, the good field region is horizontally expanded so that the injection at the higher magnetic field is possible. In addition to this, the new wiggler has a semi-closed helium liquefying system, which makes the maintenance of the device easy. The mechanical structure is shown in a three-dimensional layout in Figure 1. The coils are held in the liquid helium vessel. Two refrigerators are equiped on top of the device. One of them cools two thermal shield plates to 80 and 20 K, respectively. The other one is used for liquefying the evaporated helium gas. To suppress the heat entrance through the current lead wires for the coils, the wires are cooled with the evaporated helium gas, which is forcedly circulated in the vessel through the lead wires by a pump when the wiggler is excited. The total loss of the helium is less than 10 litters per month.

We can easily inject the electron beam at the nominal injection energy of 600 MeV with the wiggler excited less than 3.6 T, and can accelerate it up to 750 MeV almost without loss of the stored beam current.

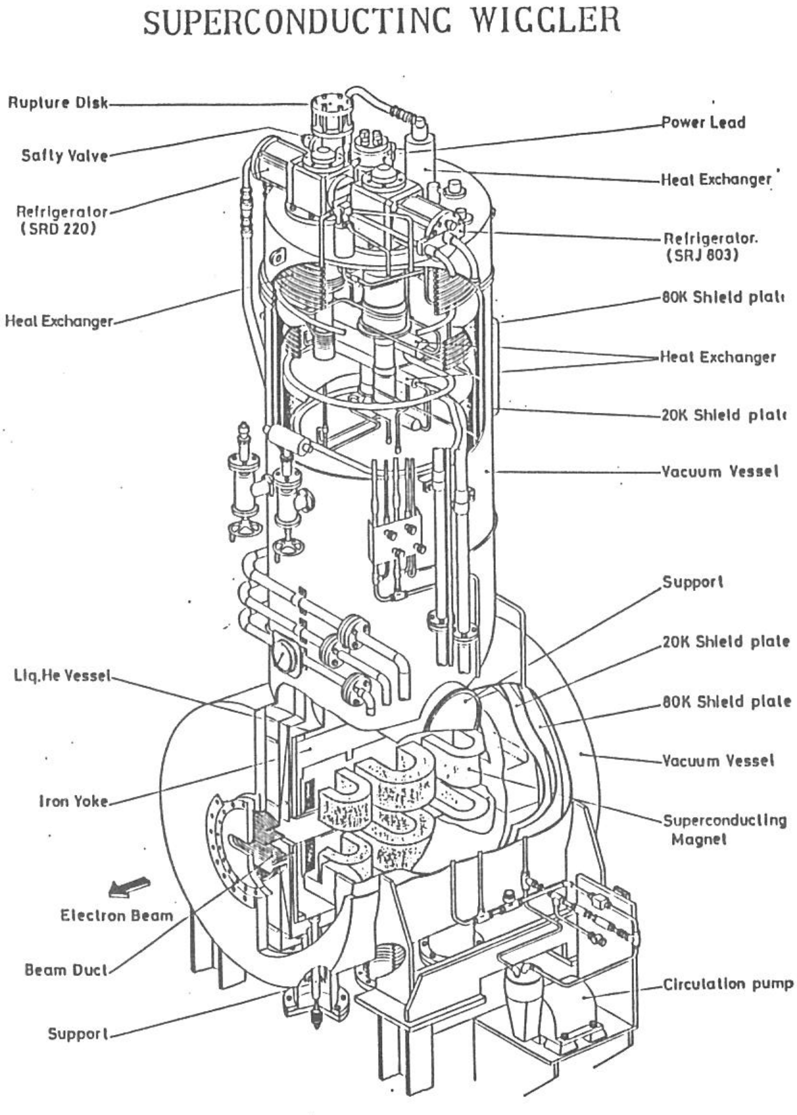

Figure 1 Mechanical structure of the superconducting wiggler.

Status of Grasshopper Monochromator at BL2B1

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A 2-meter grazing incidence monochromator (Grasshopper Mark XV: Baker Manufacturing Co.) was installed at beam line 2B1. This monochromator is specifically designed for synchrotron radiation sources. An wide wavelength range can be covered from 600Å (20 eV) to 15Å (825 eV) using three gratings: 600 l/mm, 1200 l/mm, 2400 l/mm. Performance with two gratings (600 l/m, 1200 l/m) have been already tested. Using a 600 l/m grating, the monochromator provides a scanning range from 600Å (20eV) to zero order. With entrance and exit slits of 20μm, the resolving power was ~300 (0.16Å) at Ar $L_{2,3}$ edge (~50Å, 244eV) and ~500 (0.28Å) at Kr $M_{4,5}$ edge (~137Å, 91eV). The photon flux at 100Å for 100mA ring-current with this slit widths was estimated to be ~3×10^9 /sec from photo-current measurements of a Al diode, using a typical value (0.05) of photoelectron efficiencies of Al diodes measured by Saloman[1]. For the higher resolution measurements, 1200 l/m and 2400 l/m gratings are available. Using 1200 l/m grating the photoelectron yield spectra of poly-crystalline graphite around carbon K-edge and BeO-Cu photodynode around oxygen K-edge were measured as shown in figure 1 and 2.

At present a gas cell with organic-polymer windows and a vacuum chamber are provided for absorption measurements of gases, and for absorption and photoelectron yield measurements of solids.

Reference

1) E.B. Saloman, Nucl. Instrum. & Methods 172 (1980) 79.

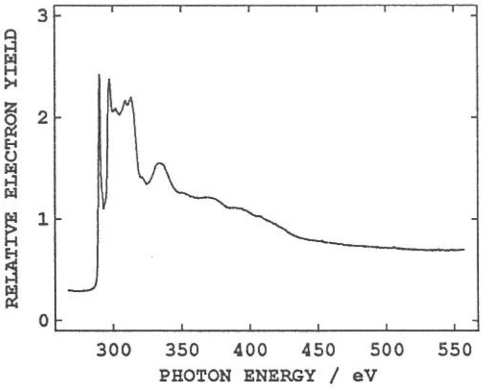

Figure 1 Photoelectron yield spectrum of polycrystalline graphite around C-K edge.

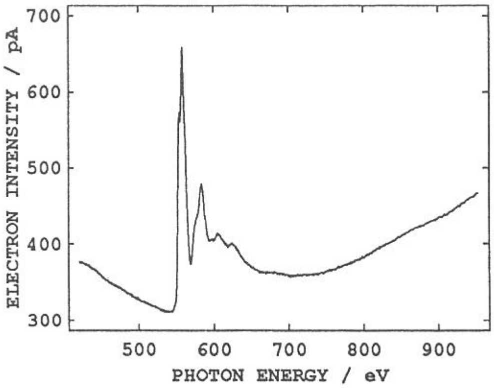

Figure 2 Photoelectron yield spectrum of a BeO-Cu photodynode around O-K edge.