

Construction of a Superconducting Wiggler

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The vertical wiggler¹⁾²⁾³⁾ of KEK-PF was constructed and installed in the 2.5 GeV electron storage ring in this October.

Figure 1 shows the vertical wiggler consisting of three pairs of superconducting coils with iron poles. NbTi wires are used for the superconducting coils which have the ratio of copper to NbTi of 1:1. After winding, the coil was molded with epoxy resin and fixed in the coil case with wedges.

The magnetic field strength of the wiggler magnet was 6.5 Tesla in the case of a single pair of coils and 5.5 Tesla after construction and without cooling of the beam duct. The measured value of magnetic fields along the orbit are shown in Fig. 2. The integrated magnetic fields along the orbit $\int B ds$ will become null by means of addition of the correction current of 4.59% to the lateral coils against the central coils.

The T shaped beam duct connecting to the high vacuum system of the storage ring has been baked up to 150°C with heated nitrogen gas. As a result, the pressure in the duct became to 9×10^{-11} Torr without beam.

During the operation of the wiggler the duct is cooled down to 70°K with gaseous He in order to suppress the temperature rises due to the synchrotron radiation and to decrease the heat intruding into the coil case. A consumption of Liq.He in the cryogenic system of the wiggler was 3.8 liters per hour.

References

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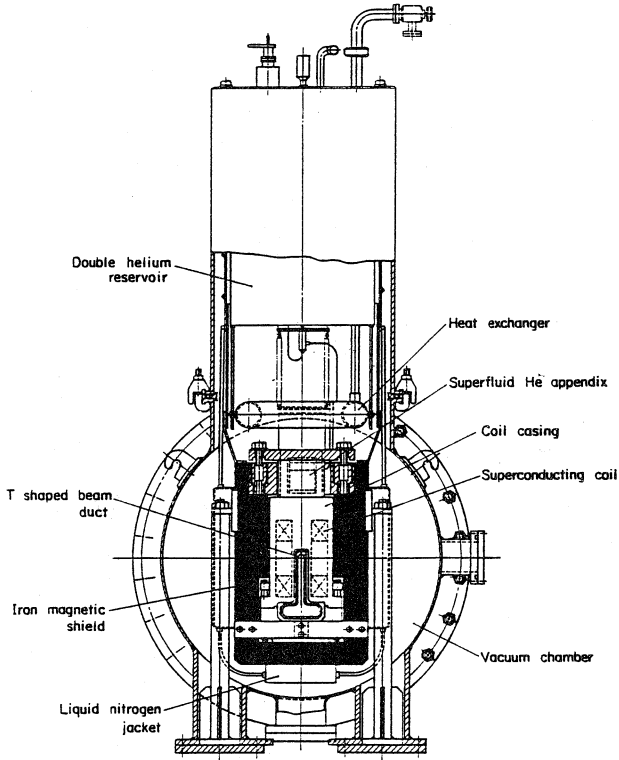


Fig.1 Cross-section of the Superconducting Vertical Wiggler

0 500 mm

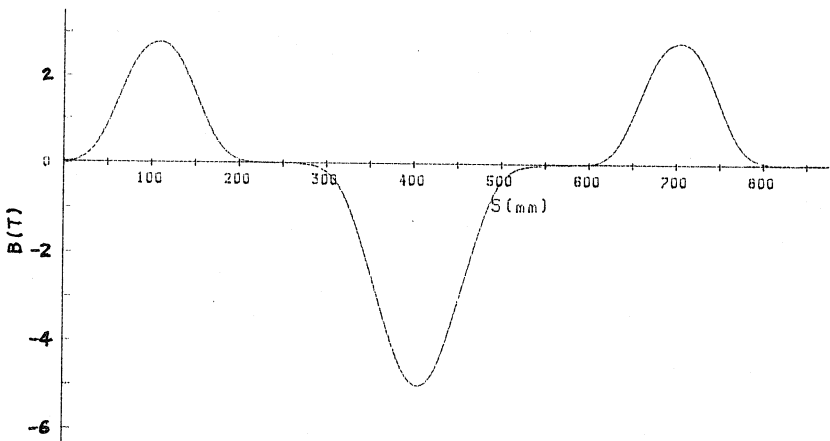


Fig.2 The magnetic field along the orbit, in the case of 5 Tesla at the central coil of the Wiggler