

Cryogenic System for Vertical Wiggler

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A superconducting vertical wiggler which is constructed at PF-KEK is cooled with superfluid helium by the following two reasons

- 1) to increase the current density of the super conductor,
- 2) to improve the cooling efficiency by mean of suppressing the boiling of liquid helium near the superconductor.

The cryogenic system for the vertical wiggler is shown in Fig. 1. Liquid helium channels in the coil housings are directly connected to a liquid helium reservoir.

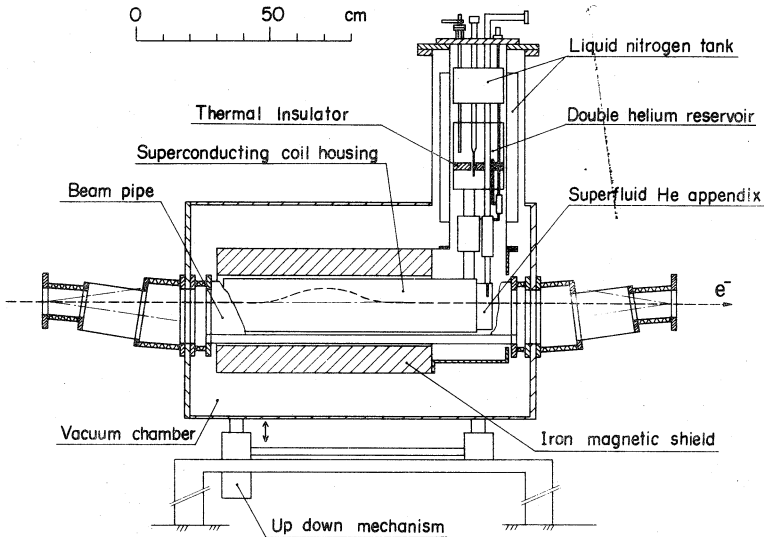


Fig.1 Cryogenic system for vertical wiggler

The reservoir is separated into two parts by using a thermal insulator which is made by a glass wool sheet of 30 mm in thickness. From the upper part of the reservoir, a helium pipe is connected through a flow adjusting nozzle to helium appendices which are attached to each coil housing. In the first stage of cooling down of the wiggler, liquid helium (HeI) with 4.2°K in temperature are filled in the whole cryogenic system.

Then, HeI in the appendices are depressurized through a vacuum pump to change HeI into superfluid helium (HeII) with 2°K in temperature.

By the use of a superfluid appendix, HeI in the coil housings and the lower part of the reservoir is changed into HeII. Using such a cryogenic system, liquid helium in the coil housings do not boil and the cooling effi-

ciency is improved.

In this system the heats intruding through current leads from the outside of the reservoir are absorbed by the vaporization of HeI in the upper part of the reservoir, so that heat flow into HeII is about 0.2 watts.

According to the experimental results with model magnet, HeI in the coil housings and the lower part of the reservoir is converted into HeII in less than an hour.

Reference

- 1) K. Huke, T. Yamakawa: to be published in Nucl. Inst. and Meth.
- 2) G. Bon Mardion, G. Claudet and J.C. Vallier: Proceedings of 6th Int. Cry. Engineering Conference (Grenoble), May (1976).