Clearing Magnet for the (n,p) Facility

J. Kamiya,[a] K. Hatanaka,[a] T. Wakasa,[a] H. Sakai,[b] A. Tamii,[b] K. Yako,[b] S. Sakoda,[b]
H. Okamura,[c] K.Suda,[c]

[a] *Research Center for Nuclear Physics (RCNP), Ibaraki, Osaka 567-0047, Japan*
[b] *Department of Physics, University of Tokyo, Tokyo 113-0033, Japan*
[c] *Department of Physics, Saitama University, Saitama 338-8570, Japan*

A beam clearing magnet was fabricated for the (n,p) facility ([1]) to introduce 300MeV proton beam into the Faraday Cup after a polarized neutron producion target ,for the reaction ^{7}Li($\vec{p}$,$\vec{n}$).

Magnetic field of 1.7T is required to bend 300MeV protons by 23.4°. To achieve the most appropriate magnetic field for the purpose, we have designed the magnet with a code for 3 dimensional magnetic field calculation (see [2]).

Fig.1 shows a picture of the fabricated clearing magnet with a scattering chamber. Schematic drawings of this C-shaped magnet are shown in Fig.2 . The total weight is 2.8tons. Fig.3 shows the exitation characteristics of the magnet. The required magnetic field is well achieved. Fig.4 shows a comparison of the simulated and the measured magnetic field distribution along X axis in Fig.2 . In this figure, field strengths are normalized by that at the pole center (16600Gauss). Table 1 shows the results of coil test at the exitation current of 220A.

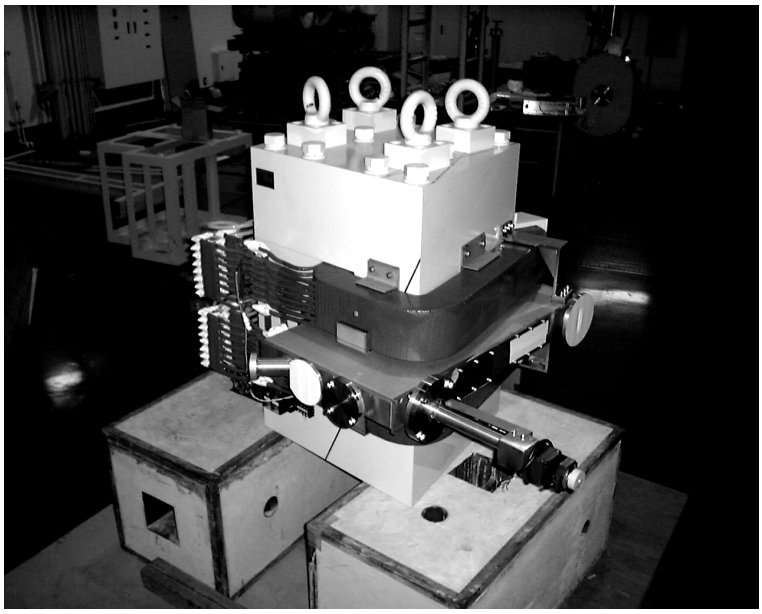

Figure 1: Clearing magnet and scattering chamber

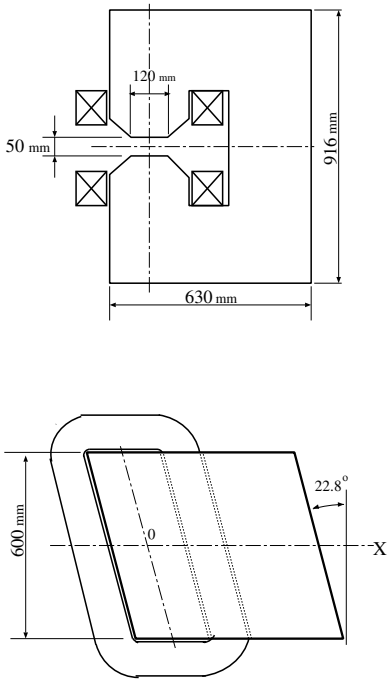

Figure 2 : Schematic drawings of the clearing magnet

Maximum current	220 A
Maximum voltage	75 V
Cooling water temperature rise	9 (°C)
Cooling water pressure drop	3.5 (kg/cm^2)
Cooling water flux	20 (l/min)

Table 1 : Characteristics of the coil

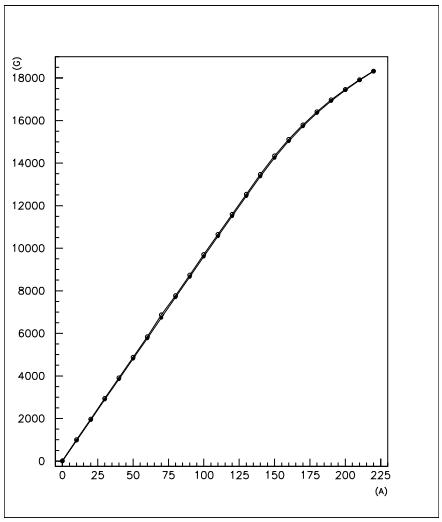

Figure 3 : Exitation of the clearing magnet ; x,y-axis show current and magnetic field, respectively

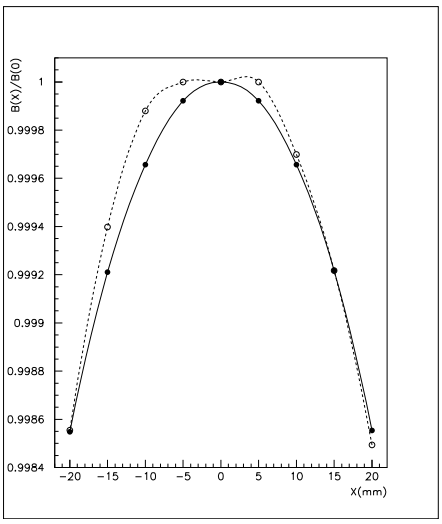

Figure 4 :Comparison of simulated(solid line) and mesured(dotted line) field distribution. ; Each value is normalised by maxmum value at x=0(16600 Gauss).

References

[1] H.Sakai *et al.*, in this Annual Report.

[2] OPERA-3d software for electromagnetic design reference manual, from VECTOR FIELDS