

DESIGN STUDY OF THE RCNP RING CYCLOTRON

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Abstract

An intermediate energy particle accelerator complex has been proposed as a new facility of RCNP. The feasibility of the proposed ring cyclotrons was confirmed by the studies with models. Recently, the high energy version of the proposal is being intensively studied.

Design study for the proposed accelerator system

The proposed accelerator system consists of two ring cyclotrons and an injector cyclotron¹⁾. Model magnets of the 1st and 2nd ring cyclotrons are made to study the properties of the orbits and the magnetic fields²⁾. Various isochronous fields are composed by using trim coils of the model^{2,3)}. Variable frequency single gap cavities are used for the rings. A full-scale model of the cavity was made for the 1st ring. An RF amplifier for the cavity is being developed⁴⁾. Considering the high radial betatron frequency ($\nu_r \approx 1.6$), the injection and the extraction systems for the 1st ring are refined⁵⁾ as shown in fig. 1. The feasibility of the proposed ring cyclotrons was confirmed by these studies.

The vacuum system for the 1st ring is being designed⁶⁾. The design goal 1×10^{-7} Torr can be attained. The phase width of the injection beam for the 1st ring must be narrow to get the single extraction mode and good beam qualities. The central region of the injector cyclotron is being studied for axially injected beams⁷⁾.

Design study for the high energy version

The high energy version of the proposal is being studied by using computer. The artificial fields calculated with computer code FIGER⁸⁾ are used for the orbit analysis of its^{9,10)}. Fig. 2 shows the equilibrium orbits for the spiral sector magnet. The beam extraction system used near $\nu_R = 2$ Resonance is carefully studied.

References

- 1) I. Miura et al., Proc. 9th Int. Conf. on Cyclotron and Their Applications, Caen (1981) p. 89.
- 2) K. Hosono et al., Proc. 9th Int. Conf. on Cyclotron and Their Applications, Caen (1981) p. 379.
- 3) K. Hosono et al., Magnet Model Study for a Proposed Ring Cyclotron at RCNP, in these proceedings.
- 4) T. Saito et al., RF System for the RCNP Ring Cyclotron, in these proceedings.
- 5) T. Itahashi et al., Injection and Extraction System for the 1st Ring Cyclotron, in these proceedings.

- 6) A. Shimizu et al., Vacuum System of the RCNP Ring Cyclotron, in these proceedings.
- 7) M. Inoue et al., Central Region of the Injector Cyclotron, in these proceedings.
- 8) I. Miura et al., A Computer Code FIGER, In these proceedings.
- 9) M. Fuki et al., Orbit Analysis of a Ring Cyclotron (I), in these proceedings.
- 10) Y. Kadota et al., Orbit Analysis of a Ring Cyclotron (II), in these proceedings.

Fig. 1.

Layout of the 1st ring.

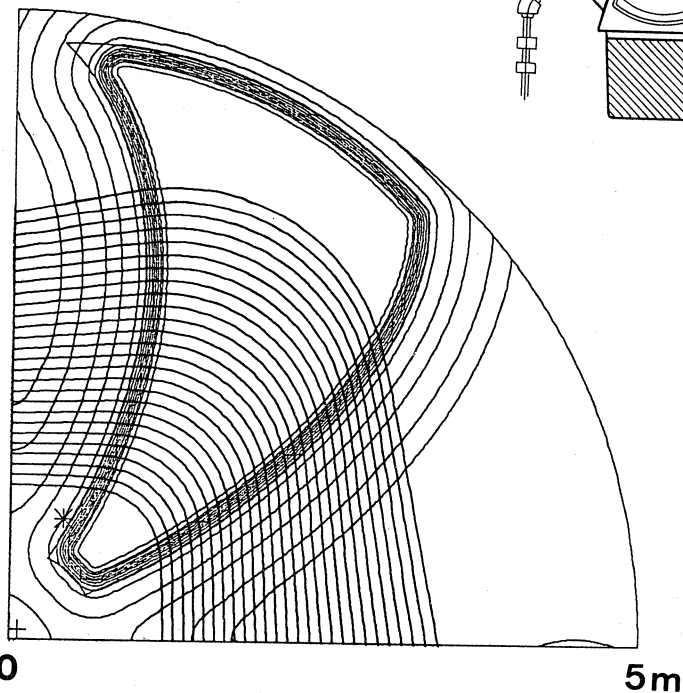
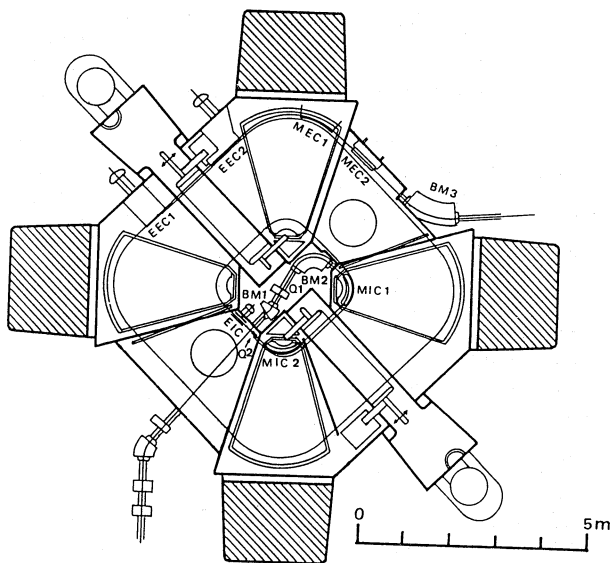


Fig. 2. Equilibrium orbits of the spiral sector magnet studied for the high energy version of the 1st ring.