



Contribution ID: 147

Type: **Poster**

Wed-Mo-Po.01-03: Design and optimization a Dipole DCT Superconducting Magnet for Compact Heavy-Ion Synchrotron

Wednesday 2 July 2025 09:15 (2 hours)

A compact synchrotron based on superconducting magnets is under development in China. The compact synchrotron, with a circumference not exceeding 35 meters, is equipped with eight superconducting dipole magnets. It is designed to accelerate multiple types of heavy-ion beams from 7 MeV/u to 430 MeV/u. The Discrete-Cosine-Theta (DCT) coil structure is used to reduce the magnet size. The central magnetic field ranges from 0.19 T to 3.32 T, with ramp rate of 1 T/s, and the region of good field is no less than 100 mm. This article focuses on the structure and optimization of magnets. To enhance excitation efficiency and improve the operational stability of the superconducting magnets, an iron yoke is placed around the coil. Optimization of the yoke has been carried out to achieve a uniform magnetic field distribution under both low and high field conditions. In order to solve the problem of the temperature rise caused by the rapid ramping rate, a hybrid approach, combining forced-flow and conductive cooling, has been used. The retention of liquid helium flow channels within the iron yoke has brought more challenges to the optimization of the magnetic field quality. The first prototype magnet is currently under fabrication.

Authors: ZHU, Yi (CAS Ion(HANGZHOU) Medical Technology Co.,Ltd); Dr YANG, Wenjie; Dr LIANG, Yu; YOU, Wei (CAS Ion(HANGZHOU) Medical Technology Co.,Ltd); LEI, Yiqin (Guoke Ion (Hangzhou) medical Technology CO., LTD); YAO, Yang (Guoke Ion (Hangzhou) medical Technology CO., LTD); WANG, Mingyao (Guoke Ion (Hangzhou) medical Technology CO., LTD); Mr ZHU, Xinlong (CAS Ion(HANGZHOU) Medical Technology Co.,Ltd); Dr RUI, Tenghui (CAS Ion(HANGZHOU) Medical Technology Co.,Ltd); Dr SHI, Jian (CAS Ion(HANGZHOU) Medical Technology Co.,Ltd); MA, Lizhen (Institute of modern physics)

Presenter: ZHU, Yi (CAS Ion(HANGZHOU) Medical Technology Co.,Ltd)

Session Classification: Wed-Mo-Po.01 - Accelerator Magnets I