

技术及应用

## BEPC II 超导插入四极磁体冷却流程的数值分析

王莉, 杜宏鹏, 杨光达, 刘孝坤, 邢志辉, 贾林祥

哈尔滨工业大学 低温与超导技术研究所, 黑龙江 哈尔滨 150001

收稿日期 2006-1-14 修回日期 2006-3-25 网络版发布日期: 2007-1-25

**摘要** 按北京正负电子对撞机重大改造工程 (BEPC II) 计划, 为压缩束团尺寸、提高探测器的分辨率以及粒子识别能力, 在南对撞区分别安装1对强聚焦超导插入四极磁体 (SCQ) 和1台超导螺线管探测器磁体 (SSM)。本文针对1对超导插入四极磁体的冷却, 采用数值模拟的方法给出了SCQ磁体分别采用超临界氦流和过冷氦流两种冷却方式下冷却流程的热力参数, 通过对模拟结果的分析, 给出了适合该超导插入四极磁体的冷却方式和正常运行的热力参数。还给出了该低温系统关键设备之一的过冷器的设计方法以及设计参数。

**关键词** [低温系统](#) [超导插入四极磁体](#) [过冷器](#) [冷却流程](#)

**分类号** [TL503.91](#)

## Numerical Analyses on Cooling Process of Superconducting Insertion Quadrupole Magnets for BEPC II

WANG Li, DU Hong-peng, YANG Guang-da, LIU Xiao-kun, XING Zhi-hui, JIA Lixiang

Institute of Cryogenics and Superconductivity Technology, Harbin Institute of Technology, Harbin 150001, China

**Abstract** A pair of superconducting insertion quadrupole magnets(SCQ), and a superconducting solenoid magnets(SSM) were used in the Beijing Electron-Positron Collider Upgrade (BEPC II) in order to reduce the length of the beam, and to increase distinguish and identification ability of the particle. A cryogenic plant of 500 W at 4.5 K was to be built for the operation of the superconducting magnets. The paper described the cooling process for the SCQ and SSM magnets. Two kinds of cooling schemes for SCQ magnets, supercritical helium cooling and subcooled liquid helium cooling, were compared by numerical method. Thermal parameters of two kinds of cooling process were provided. Finally, the design of the subcooler, one of key components was presented.

**Key words** [cryogenic system](#) [superconducting insertion quadrupole magnet](#) [sub-cooler](#) [cooling process](#)

DOI

通讯作者

### 扩展功能

#### 本文信息

- ▶ [Supporting info](#)
- ▶ [\[PDF全文\]\(695KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

#### 服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

#### 相关信息

- ▶ [本刊中 包含“低温系统”的 相关文章](#)
- ▶ 本文作者相关文章

- [王莉](#)
- [杜宏鹏](#)
- [杨光达](#)
- [刘孝坤](#)
- [邢志辉](#)
- [贾林祥](#)