

技术及应用

合肥光源束流输运线线性光学参数设计研究

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摘要 合肥光源由800 MeV电子储存环、200 MeV直线加速器和束流输运线组成。束流输运线线性光学参数是影响束流传输效率和储存环注入效率的关键因素。在分析合肥光源现束流输运线性能基础上, 重新优化设计输运线聚焦结构。新设计在改善输运线与储存环之间Twiss参数和色散函数匹配基础上, 更好地控制传输过程中束流包络, 并减轻了开关磁铁幅度抖动对传输束流末态位置的影响。通过优化光学参数设计, 束流传输效率将明显改善, 同时参数匹配将有利于提高储存环注入效率。并且, 新设计中的主磁铁磁场强度较低, 输运线具备传输800 MeV束流的能力。

关键词 [束流输运线](#) [聚焦结构 \(磁格\)](#) [Twiss参数](#) [色散函数](#) [匹配](#)

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Linear Optics Design of New Beam Transfer Line in Hefei Light Source

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Abstract The Hefei Light Source (HLS) is composed of 800 MeV electron storage ring, 200 MeV linac and beam transfer line, whose linear optical characteristics is one of the key factors determining the beam transfer efficiency and beam injection efficiency. Based on the analysis of the performance of current beam transfer line, the lattice of transfer line was redesigned and optimized. In the new design, the matching of Twiss parameters and dispersion functions between transfer line and storage ring was realized, the beam profile along transfer line was well controlled, and the effect of amplitude jitter of pulsed magnet on final beam position was alleviated. By optimizing the linear optics, the beam transfer efficiency would be improved, and the parameter matching would be helpful to enhance beam injection efficiency. Furthermore, there is the potential to transfer 800 MeV beam with its moderate magnetic field strength of main magnets.

Key words [beam transfer line](#) [lattice](#) [Twiss parameter](#) [dispersion function](#) [matching](#)

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