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Design of the gradient dipole magnet for LLICTF

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The Lanzhou Light Ion Cancer Therapy Facility (LLICTF) is a compact medical accelerator currently under construction. It is designed to treat cancer using a 230MeV, 30mA H⁺ beam and a 85MeV/u, 1mA ³He²⁺ beam. The facility comprises two ion sources, a low-energy beam-transport (LEBT), a Radio Frequency Quadrupole (RFQ), a medium-energy beam-transport (MEBT), and the main ring accelerating structure. Due to the presence of two ion sources, it is necessary to introduce a dipole magnet which is symmetrically focused as much as possible to meet the symmetrical focusing requirements of the LEBT beam. Therefore, a gradient dipole magnet has been designed to achieve this symmetrical focusing. This paper discusses the theoretical and simulated symmetric focusing of the gradient dipole magnet. It also analyzes the effect of fringe fields and space charge. Additionally, the paper presents the results of the model design with CST and the multi-particle simulation results with TraceWin.

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Footnotes

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Primary author: CHU, Yimeng (Institute of Modern Physics, Chinese Academy of Sciences)

Co-authors: WONG, Chun Yan Jonathan (Institute of Modern Physics, Chinese Academy of Sciences); CHEN, Weilong (Institute of Modern Physics, Chinese Academy of Sciences); XU, Zhenyu (Institute of Modern Physics, Chinese Academy of Sciences); LIANG, Zehua (Institute of Modern Physics, Chinese Academy of Sciences); SUN, Kunxiang (Institute of Modern Physics, Chinese Academy of Sciences); WANG, Zhijun (Institute of Modern Physics, Chinese Academy of Sciences)

Presenter: CHU, Yimeng (Institute of Modern Physics, Chinese Academy of Sciences)

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