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Production of intense carbon beams for long-term stable operation with an all-permanent magnet electron cyclotron resonance ion source

An all-permanent magnet electron cyclotron resonance ion source-LAPECR3 (Lanzhou All Permanent magnet Electron Cyclotron Resonance ion source No.3) had been developed as the dedicated C5+ ion injector of Heavy Ion Medical Machine (HIMM) accelerator facility since 2009 in China. The first HIMM demo facility was built in Wuwei city in 2015, and the facility had been officially licensed to treat patients in early 2020. The facility has been proven to be very effective, and more than 700 patients have been treated so far. There are still some details that should be improved to make the facility more reliable and stable. For instance, LAPECR3 ion source could produce more than 100 eμA of C5+ ion in the early stage of ion source operation. However, after several months'operation, there would be serious carbon contamination on the chamber wall, which reduces the performance of the ion source and leads to unscheduled maintenance. In order to improve the performance of the ion source for long term operation, some approaches, for instance plasma cleaning technique, had been taken to reduce carbon contaminations. This paper will introduce the attempts to reduce the carbon contaminations and present the latest results of the ion source.

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Email Address

lijiaqing@impcas.ac.cn

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Yes

Presenter if not the submitter of this abstract

Primary author: LI, Jiaqing (Institute of Modern Physics, Chinese Academy of Sciences)

Co-authors: SUN, Liangting (Institute of Modern Physics, Chinese Academy of Sciences); Dr CAO, Yun (Institute of Modern Physics, Chinese Academy of Sciences); Mr MA, Jindou (Institute of Modern Physics, Chinese Academy of Sciences); Mr JIN, Gang (Institute of Modern Physics, Chinese Academy of Sciences); Mr CHANG, Zhidong (Institute of Modern Physics, Chinese Academy of Sciences); Ms ZHANG, Xuezhen (Institute of Modern Physics, Chinese Academy of Sciences)

Presenter: LI, Jiaqing (Institute of Modern Physics, Chinese Academy of Sciences)

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