Contribution ID: **2724** Contribution code: **TUPM138** Type: **Poster Presentation**

Optimization of low-energy slow extraction efficiency of XiPAF

Tuesday, 9 May 2023 16:30 (2 hours)

Xi'an Proton Application Facility (XiPAF) synchrotron provides 10~200MeV proton beam for the experimental simulation of the space radiation environment. Due to the space charge effect, the slow extraction of 10 MeV proton beam is a work full of challenges. In a past experiment, the total extraction efficiency was over 65% with 4.5 ~ 6.5×1010 protons stored before extraction but decreased to 52% with 9×1010 protons stored. In order to study the beam loss caused by a strong space charge effect, based on experimental parameters, the beam loss fractions at different positions of XiPAF synchrotron are obtained through the simulation. According to the beam loss analysis, optimized parameters are found for reference in subsequent experiments. It is also noted that negative beam average momentum spread before extraction is beneficial to the improvement of extraction efficiency

Funding Agency

Work supported by National Natural Science Foundation of China (No. 12075131)

Footnotes

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Yes

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Session Classification: Tuesday Poster Session

Track Classification: MC4: Hadron Accelerators: MC4.T12: Beam Injection/Extraction and Transport