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Research on longitudinal dynamics and design of RF parameters of synchrotron for XiPAF-upgrading project

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Xi'an 200 MeV Proton Application Facility (XiPAF) will be upgraded to proton and heavy ion synchrotron recently. In order to ensure the enough life of heavy ion beam, the synchrotron requires ultra-high vacuum, and the designed static vacuum is better than 5×10^{-10} Pa. In order to place enough vacuum pumps in the synchrotron, the circumference of the synchrotron was increased from 30.9m to 39.96 m. The cyclotron frequency range of heavy ions is 0.49~1.03 MHz. In order to reduce the engineering difficulty and improve the lower limit of frequency bandwidth requirement of the RF system, the harmonic of $h=2$ is used to capture and accelerate the heavy ions, and the frequency bandwidth range of the RF system is adjusted from 1~6 MHz to 0.8~5.0 MHz. In this paper, the longitudinal dynamics parameters of the upgraded synchrotron are designed, and the simulation calculation is carried out. Finally, the parameter requirements of the RF system are proposed.

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Footnotes

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Primary author: LI, Yan (Tsinghua University in Beijing)

Co-authors: LIU, Wolong (State Key Laboratory of Intense Pulsed Radiation Simulation and Effect); YANG, Ye (Tsinghua University in Beijing); LIU, Xiaoyu (Tsinghua University in Beijing); ZHAO, Mingtong (State Key Laboratory of Intense Pulsed Radiation Simulation and Effect); WANG, Zejiang (Tsinghua University in Beijing); XIONG, Yang (Tsinghua University in Beijing); ZHENG, Shu-xin (Tsinghua University in Beijing); YAO, Hongjuan (Tsinghua University in Beijing); XING, Qingzi (Tsinghua University in Beijing); GUAN, Xialing (Tsinghua University); WANG, Xuewu (Tsinghua University in Beijing); WANG, Zhongming (State Key Laboratory of Intense Pulsed Radiation Simulation and Effect); QIU, Mengtong (State Key Laboratory of Intense Pulsed Radiation Simulation and Effect)

Presenter: LI, Yan (Tsinghua University in Beijing)

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