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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 recent-ly. In order to ensure the enough life of heavy ion beam, the synchrotron requires ultra-high vacuum, and the de-signed static vacuum is better than $5 \times 10-10$ 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 en-gineering difficulty and improve the lower limit of fre-quency 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 require-ments of the RF system are proposed.

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Footnotes

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