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Tune Optimization in the rapid cycling synchrotron of China Spallation Neutron Source

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

The design betatron tune of the rapid cycling syn-chrotron (RCS) of China Spallation Neutron Source (CSNS) is (4.86, 4.78), which enables incoherent tune shifts to avoid serious systematic betatron resonances. Serious beam instability was observed when the opera-tional bare tune was set to (4.86, 4.78). The tunes dur-ing the beam acceleration were optimized based on the space charge tune shift and beam instability. Waveform compensation on CSNS RCS quadrupole magnets was performed to accurately control and optimize the tune variation during the beam acceleration process. After the tune optimization, the beam loss induced by space charge and beam instability was well controlled. The beam power of CSNS achieved the design value 100 kW with small uncontrolled beam loss.

Funding Agency

Footnotes

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Yes

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