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Commissioning and Operation experience of the CSNS Linear accelerator

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The China Spallation Neutron Source (CSNS) accelerator complex comprises an 80 MeV H^- normal-conducting linear accelerator (linac), a 1.6 GeV rapid cycling synchrotron (RCS), and associated beam transport lines. Following multiple rounds of beam commissioning, the beam power delivered to the target has been successfully increased to 170 kW, surpassing the design value by 70%. Building on this achievement, the power upgrade project (CSNS-II) was launched in 2024, aiming to elevate the beam power to 500 kW. This upgrade presents significant challenges for the linac, requiring a fourfold increase in beam current and a fortyfold increase in beam power. To address these challenges, extensive beam studies have been conducted at the linac. These studies focus on optimizing the lattice and beam matching, precisely measuring beam parameters, refining the computer model, investigating beam loss mechanisms, and implementing strategies to minimize beam loss. These efforts are critical to ensuring the successful realization of the CSNS-II power upgrade.

Footnotes

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