



Contribution ID: 55 Contribution code: **THPT69**

Type: **Poster Presentation**

Tune Optimization for CSNS-II RCS: Simulations and Machine Studies

Thursday, October 23, 2025 5:10 PM (20 minutes)

Based on the beam commissioning of CSNS-I RCS, the current tune above the half-integer resonance exhibits extremely narrow parameter margins and severe instabilities. Therefore, to further increase the beam power in Phase II, significant optimization of the tune is required.

First, we conducted a series of simulations. A total of 97 tunes were selected on the resonance diagram, and the beam transmission efficiency was simulated, taking into account space charge effects and instabilities. The results demonstrate that the tunes below the half-integer resonance (near 4.3/5.3) are instability-free and can achieve transmission efficiencies exceeding 99% (up to 140 kW in Phase I and 700 kW in Phase II).

Subsequently, to verify stable operation at the tunes near 4.3/5.3 in the actual machine, we performed a series of machine studies. The results confirm that these tunes remain instability-free and can achieve stable beam supply at 140 kW (corresponding to 700 kW in Phase II under equivalent space charge tune shift conditions). This provides strong evidence that the selected tunes can support stable 700 kW beam operation during Phase II commissioning.

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

Authors: CHEN, Jianliang (Chinese Academy of Sciences); AN, Yuwen (Institute of High Energy Physics); LIU, Hanyang (Institute of High Energy Physics); LI, Yong (Dongguan Neutron Science Center); TAN, Jiajie (Institute of High Energy Physics); HUANG, Ming-Yang (Institute of High Energy Physics)

Presenter: CHEN, Jianliang (Chinese Academy of Sciences)

Session Classification: THPT poster session

Track Classification: WGA:Beam Dynamics in Rings