Contribution ID: **2** Contribution code: **TUICC02** Type: **Invited Oral Presentation**

High intensity beam commissioning and operation of the CSNS RCS

Tuesday, October 21, 2025 2:00 PM (30 minutes)

For the China Spallation Neutron Source (CSNS), the rapid cycling synchrotron (RCS) accumulates and accelerates the injection beam to the design energy of 1.6 GeV and then extracts the high energy beam to the target. The CSNS design beam power is 100 kW, with the capability to upgrade to 500 kW. By February 2020, the beam power had reached 100 kW, and through improvements, the beam power was increased to 170 kW. During the beam commissioning process, the beam loss caused by space charge effects was the most significant factor limiting the increase in beam power. Additionally, unexpected collective effects were observed, including coherent oscillations, when the beam power higher than 50 kW. Through a series of improvements, the space charge effects and collective instabilities causing beam loss were effectively controlled. In this paper, the key issues and intense beam effects during the beam commissioning and operation of the CSNS RCS will be studied in detail and their solutions and suppression methods will be given.

Footnotes

Funding Agency

This work is jointly supported by the Guangdong Basic and Applied Basic Research Foundation (No. 2021B1515120021).

I have read and accept the Privacy Policy Statement

Yes

Authors: HUANG, Ming-Yang (Institute of High Energy Physics); XU, Shouyan (Institute of High Energy Physics); LU, Xiaohan (Institute of High Energy Physics); HUANG, Liangsheng (Institute of High Energy Physics); LIU, Hanyang (Institute of High Energy Physics); LI, Yong (Institute of High Energy Physics); AN, Yuwen (Institute of High Energy Physics); CHEN, Jianliang (Institute of High Energy Physics); ZHOU, Kai (Institute of High Energy Physics); PENG, Jun (Institute of High Energy Physics); LI, Zhiping (Institute of High Energy Physics); HAN, Yanliang (Institute of High Energy Physics); YUAN, Yaoshuo (Institute of High Energy Physics); LIU, Huachang (Institute of High Energy Physics); LI, Xiao (Institute of High Energy Physics); ZHANG, Yuliang (Institute of High Energy Physics); Dr QI, Xin (Institute of High Energy Physics); QIN, Xing (Institute of High Energy Physics); WANG, Sheng (Institute of High Energy Physics)

Presenter: HUANG, Ming-Yang (Institute of High Energy Physics)

Session Classification: TUICC WGD invited oral

Track Classification: WGD:Operations and Commissioning