



Contribution ID: 101 Contribution code: THFA03

Type: Flash Poster Presentation

Simulation Study of Space Charge Effects on Transverse Coupled-Bunch Instabilities

Thursday, October 23, 2025 2:10 PM (5 minutes)

Coupled-bunch instabilities will occur with long-range wakefields. And it's an effective way to adjust the chromaticity to suppress transverse coupled-bunch instabilities. There are some theoretical studies showing that strong space charge can weaken the suppression effect of chromaticity. In this paper, transverse coupled-bunch instabilities with space charge are simulated and analysed using PyORBIT and PyHEADTAIL. Results reveal that under strong space charge, the oscillation modes depend solely on the longitudinal position, which weakens the effect of chromaticity, with higher-order modes (l is large) becoming dominant. When space charge is extremely strong, only the $l = 0$ mode remains observable.

Footnotes

Funding Agency

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Yes

Author: RAO, Li (Institute of High Energy Physics)

Co-authors: LIU, Hanyang (Institute of High Energy Physics); HUANG, Liangsheng (Institute of High Energy Physics)

Presenter: RAO, Li (Institute of High Energy Physics)

Session Classification: THFA WGs flash talks

Track Classification: WGA:Beam Dynamics in Rings