IPAC'25 - the 16th International Particle Accelerator Conference



Contribution ID: 655 Contribution code: WEPM096

Type: Poster Presentation

# Formulas of coherent synchrotron radiation induced microbunching instability in an arbitrary dogleg lattice

Wednesday 4 June 2025 16:00 (2 hours)

The microbunching instability (MBI) has long been a persistent issue in high-brightness electron beam transport. The dogleg structure, a dispersive configuration composed of two quadrupole magnets and dipole magnets, has drawn attention in recent studies. It has been pointed out that the Landau damping effect can be enhanced to effectively suppress the microbunching instability by adjusting the strength of two quadrupole magnets preceding the dogleg structure. In this work, we derive an analytical formula for the CSR-induced microbunching gain in a dogleg lattice based on the iterative approach. The formulas have been benchmarked against semi-analytical Vlasov calculations. The analytical formulas obtained in this paper can be used to explore the influence of the strength of the quadrupole magnets in front of the dogleg lattice on the final microbunching instability, and also to verify the effectiveness of suppressing MBI in the dispersive region where the dogleg is located.

## Footnotes

## Paper preparation format

LaTeX

## **Region represented**

Asia

## **Funding Agency**

This work is supported by the Fundamental Research Funds for the Central Universities (HUST) under Project No. 52400059.

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Session Classification: Wednesday Poster Session

**Track Classification:** MC5: Beam Dynamics and EM Fields: MC5.D05 Coherent and Incoherent Instabilities Theory, Simulations, Code Development