Introduction

Previous studies already showed that the FCC-hh beam intensities are limited by the resistive wall and the collimator impedances. In addition, electron clouds also contribute to the total impedance and could be the cause of instabilities. Numerical model of beam instabilities taking into account the impedance model is being developed. This should also be extended and include electron clouds.

References


Resistive wall impedance

Due to the 100 km of beam pipe length, at injection the most critical issues will be the resistive wall impedance.

Collimator impedance

At collision energy the most important is the collimators’ impedance.

Ecloud build-up

Comparison for electron cloud build-up between LHC-like (left) and FCC (right) geometry of beam screen for the case B = 0T and B = 1T.

Conclusion and Outlook

Resistive wall impedance:
- comparison between formula, ReWall & BI2D
- growth rate is about 100 turns at injection and 1500 turns at top energy

Collimator impedance:
- comparison between formulas & BI2D
- growth rate is about 3800 turns at injection and 8000 turns at top energy

Conclusion:
the impedance and coupled-bunch growth rate study confirms previous results

Future plans:
- electron cloud study with openecloud (O. Haas)
- creating the numerical model for studying the electron cloud build-up and instabilities

Beam instability study for FCC-hh

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Introduction

Transverse coupled-bunch growth rate

One important effect of the resistive wall on the single bunch dynamics is related to the transverse coupled-bunch instability.

Resistive wall impedance:
- comparison between formula, ReWall & BI2D
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Collimator impedance:
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- growth rate is about 3800 turns at injection and 8000 turns at top energy

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References


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