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Transverse mode-coupling instability with Landau cavities at the MAX IV laboratory 1.5 GeV ring

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Collective effects can have a strong influence on the beam stability and performance in synchrotron light sources. Landau cavities or RF harmonic cavities are a tool that is employed at 4th generation storage ring light sources to reduce the impact of or even prevent instabilities arising from collective effects. The positive effect of Landau cavities is based on the lengthening of the electron bunches and an increase in synchrotron tune spread.

Recent theoretical calculations by M. Venturini (2018) predict that under certain conditions the presences of landau cavities could however enhance specific collective effects and lead to a lowered instability threshold. So was, for zero chromaticity, the transverse mode-coupling instability (TMCI) threshold calculated to be reduced in the presences of landau cavities.

This contribution presents measurements conducted at the MAX IV 1.5 GeV storage ring, where, to test the prediction, the TMCI threshold was measured with and without bunch-lengthening using passive Landau cavities. The effect of increased, non-zero chromaticity was also investigated.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

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