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# Landau damping of intra-bunch oscillations

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Octupole magnets are foreseen in the FCC-hh lattice as a passive mitigation of the transverse collective instabilities. The incoherent betatron tune spread due to octupoles provides Landau damping of the unstable bunch modes. The previous studies for FCC, and estimations for LHC, have considered only the rigid bunch modes. The higher-order modes cause intra-bunch oscillations, which are differently affected by a tune spread . We study the Landau damping of the higher-order bunch modes due to octupoles using the modified dispersion relation and the particle tracking simulations. For a comparison, Landau damping due RF Quadrupoles is considered.

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