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FCC-hh single beam intensity limitations and cures

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Landau damping provided by dedicated octupole magnets should be employed in the FCC-hh as a cure against transverse coherent instabilities, in addition to a transverse feedback system. In the LHC, the Landau octupoles are routinely combined with finite chromaticity and the transverse feedback system in order to ensure the bunch stability through the cycle. We estimate the required Landau damping for coherent transverse instabilities driven by the beam screen impedance. Stability estimates from two-dimensional dispersion relations with octupoles and other Landau damping mechanisms are compared to particle tracking studies. For the FCC-hh design beam parameters the electron cloud buildup should be suppressed by the foreseen a-C screen coating. We estimate the residual electron cloud density and the scaling of the electron cloud induced heat load and tune shifts with energy and screen diameter.

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