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Emittance tuning knobs for the Main Linac of CLIC 380 GeV

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The high luminosity specifications for future linear colliders, such as the Compact Linear Collider (CLIC), require extremely small vertical beam emittance at the interaction point. Achieving this relies on minimizing the emittance growth in the collider sub-systems. One major source of emittance growth is in the Main Linac, mainly due to misaligned quadrupoles and accelerating structures. The current budget for normalized emittance growth is 5 nm for static misalignments and another 5 nm for dynamic imperfections. The budget for the static imperfections is achieved through the use of beam-based alignment, such as one-to-one correction, dispersion-free steering, and the realignment of accelerating structures. In this work, we explore the use of additional emittance tuning bumps to further decrease the emittance growth and to provide additional leverage for the tuning.

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