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Exploration of Non-Linear FCC-ee Optics

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To achieve the desired experimental outcomes at the FCC-ee, precise control of linear and non-linear optics is essential. Amplitude dependent tune shifts, higher order chromaticity and resonant driving terms (RDTs) are examples of non-linear optics parameters which must be understood and controlled. Two key figures of merit for the collider ring are the dynamic aperture (DA) and momentum acceptance (MA). They are strongly linked to these non-linear optics parameters which are in turn dependent on lattice and field errors.

Currently, two optics designs are under evaluation for the FCC-ee: the Global Hybrid Correction (GHC) optics and the Local Chromatic Correction (LCC) optics. In this work, we aim to characterize non-linear optics parameters for both the GHC and LCC designs. In future steps, correction techniques for non-linear optics control will be investigated.

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