NEWS FROM OPTICS REPOSITORY

https://gitlab.cern.ch/acc-models/fcc/fcc-ee-lattice

Latest versions of optics

V24.3_GHC

- Added optics, provided by Oide-san, at all four operating points, in both SAD and MAD-X formats (19 May 2024 Oide-san)
- High beta star optics at Z operating point, by Oide-san, added in both SAD and MAD-X formats: **fccee_z_hibs**
- Small fix of geometry issue in non-colliding insertions at Z and W operating point (MAD-X lattices; SAD untouched)
  BRX2 and BRX1 are now equal and opposite, compensated with BRI1
- Added two solenoid compensation schemes at Z operating point in toolkit (see below)
- Added **RFdefinitions_<mode>.madx** for all <modes>, to install a more realistic model of RF modules; add-on, MAD-X only

Latest versions of optics

V24.3_LCC

- Added optics provided by P. Raimondi at Z and t-tbar operating points, in both MAD8 and MAD-X formats
- Added two solenoid compensation schemes at Z operating point in toolkit (see below)
- New high beta star optics at Z operating point matched by K. Andre and added : **fccee_z_hibs.seq**
- Added **fccee_zRF.seq** and **fccee_tRF.seq** with a more realistic model of RF modules
  - Still need rematching of the geometry (crossing beams at non-colliding insertions)

Higher Beta* optics

- Matched to betx* = 0.3m and bety* = 0.07m for both GHC optics (Oide-san) and LCC optics (K. André)
- Only for the Z operating point

- Attempts at ballistic optics by K. André not succesfull yet.

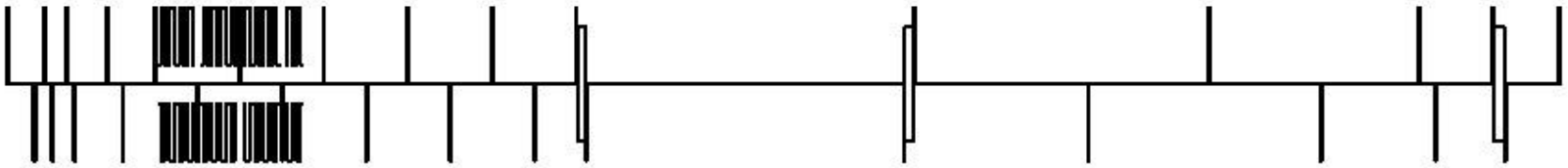
Solenoid compensation schemes

- Translation of work done by A. Ciarma in MDI working group (see presentations there)

- Baseline scheme (or local scheme)
  - detector solenoid (2T) and compensating solenoids (-3T) side by side.
  - Hardly any coupling outside
  - Fringe fields at 2T / -3T interface generates high radiation
  - Model is quasi independent of optics since everything is inserted between the last quadrupoles and IP.

- Standard scheme (or distributed scheme)
  - Compensating solenoids are installed in first long drift before and after the final quadrupoles
  - Lower fringe fields and much lower radiation
  - Model is dependent upon optics for locating compensation solenoids
  - Final quadrupoles are in a tilted frame and on a local orbit bump
  - Requires additional skew quadrupoles to compensate coupling within insertion region.

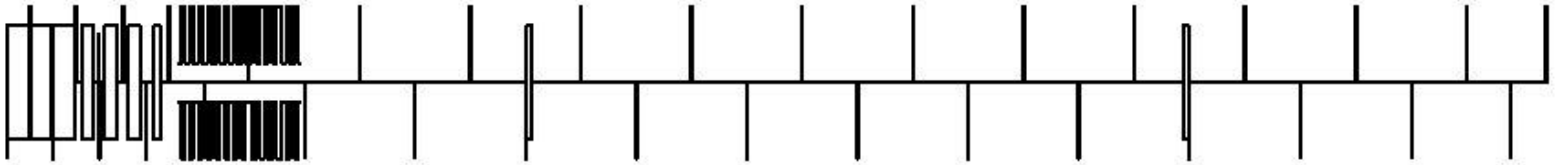
RF model



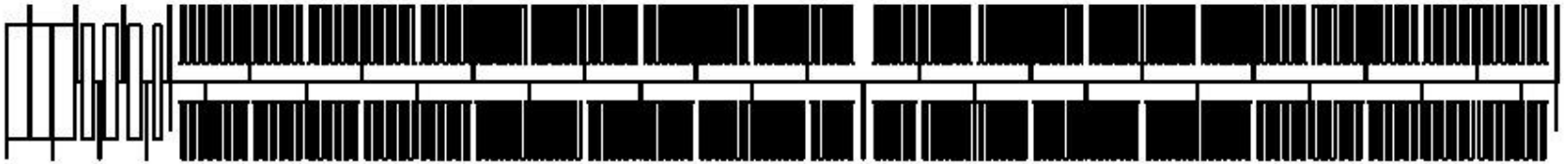
V24.2_GHC RF at Z

V24.2_GHC RF at t-tbar

RF model



V24.3_LCC RF at Z



V24.3_LCC RF at t-tbar

To be done

- Match RF geometry for V24.3_LCC at all energies
  - Probably needs to modify the end of arcs / dispersion suppressors

- Provide both thick and thin lattices in json format in the lattices directory.
  - Need to build and test automatically
  - J. Salvesan provided a python script SAD -> Xsuite; to be compared to the SAD -> MAD-X format ->Xsuite

- Provide solenoid compensation at all operating points
  - Should be a simple linear scaling of B fields to strengths at all energies

- Develop solenoid model and compensation with Xsuite, MAD-NG and SAD
  - avoid the dependence of the orbit on field-map in MAD-X
  - properly implement the correctors and features (nested corrections and rotations)

- Provide Collimation optics (Point F/4) and Injection/Extraction (Point B/2) optics

- Provide electron / counterclockwise sequences explicitly
  - Care for single beam magnets vs shared magnets and beamlines (RF)