FCCIS – The Future Circular Collider Innovation Study. This INFRADEV Research and Innovation Action project receives funding from the European Union's H2020 Framework Programme under grant agreement no. 951754.

FCC HEB optimisation Tools

A. Chance, B. Dalena, H. de Grandsaignes (CEA)

B. Haerer (KIT)

Thanks to:

T. Charles, L. Van Riesen-Haupt, R. Tomas, F. Antoniou, T. Persson, A. Franchi, A. Latina

HEB LATTICE GENERATION and optimization

https://gitlab.cern.ch/fcc-optics/fcc-ee-heb

e-mail: antoine.chance@cea.fr

Based on:

- **EuroCirCol** experience
- Previous generator from Bastian Haerer
- Python + MadX

Recently added:

- Theoretical tool to compare lattice properties for different lattice cells
- Analytical computation of emittance evolution
  - collaboration with Fanouria & Co on IBS (meeting on November 26th)
- Scripts for **DA** evaluation using **PTC thick track**
  - to be updated after discussion with Leon and Tobias

Rather simple to use, modular structure, work in progress…

What we would like to do…

… where we can find synergy…

- Linear and Non linear imperfections (**alignment and field errors**)
  - starting discussions and implementation of errors in MadX

- Emittance tuning (to **define correctors and tolerances** for the Booster)
  - similar fashion as Tessa or light sources/LHC
  - looking also at alternative **machine learning algorithms** (**Thesis proposed**)

- **DA** with errors
  - after orbit, beta-beat, dispersion, non-linear field, etc… correction
  - fields errors => thin lattice… ? PTC ?

- **Start to end simulations** of the booster energy ramp (to evaluate final emittance reach)
  - still looking for good tool to do it and relevant physics process (collective effects)…