

RF Systems - R&D, Design and Fabrication

1.800 MHz SRF cavities with $Q_0 = (3 \rightarrow 6)e10$ at 25 MV/m; then 4-cavity **Cryomodules**

- 28 RF cryomodules are needed for the Higgs operation,
- mb 244 CMs (later) for Booster/Collider Rung at *ttbar*

2. High efficiency **power sources** for 800 MHz with $\eta > 80\%$

3. High gradient 70 MV/m 150 MOhm/m **copper RF** for injector,

- 6-18 GeV RF high gradient inj. Linac

Magnets/MDI - R&D, Design and Fabrication

1. IR magnets, cryostats, masks (for 4 IPs)
2. FCCee collider ring magnets (low field, DC)
3. Booster ring magnets (low field, ~ 1 s ramp)
4. Polarization wigglers (0.1-0.7 T)
5. FCChh collider ring magnets (~ 16 T, DC)
 - Already part of the GARD magnets (MDP)

“Dynamics” - R&D, Design and Fabrication

1. Interaction region design, and integrated machine design

- Modeling/simulations: crab waist and beam-beam/beamstrahlung, DA, chromatic compensation and optics correction schemes

2. Losses, collimation and background

- Modeling/simul: halo formation, background in detectors, TMCI, efficient collimation system(elens/NLO/CS), detector background masking, build collimation system for 4 IRs and rings

3. Polarization (esp. at 45 GeV and 80 GeV beam energies):

- Modeling/simulations: 45-80 GeV energy calibration, error analysis, design and build wigglers, polarimeters, polarized sources

4. Instrumentation:

- Design and prototyping, then build, luminosity monitors , TMCI feedback systems emittance and halo monitors

Possible Additional Scope for Later Considerations:

1) 18.4 GV of SRF for *ttbar* collider operations

– By 2055; after the Higgs-Phase ramps down

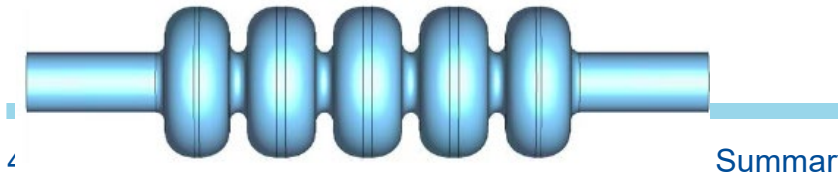
2) Magnets for the collider and booster rings

3) 270 km of beam pipes (collider, booster)

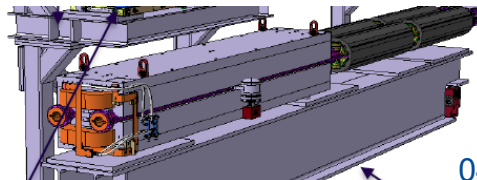
4) Infrastructure contributions

– Alignment | Radiation protection | Safety systems | Power converters

– The need, scope, cost and timeline ?



Summar



04/25/2023

