



# MPE Summary

**Jan Uythoven, with thanks to Daniel Wollmann**

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# Study topics of the MPE group (as distributed within TE on 4th March 2024)

- 1. Failure modes and beam studies, including beam dust interactions (UFOs)**
- 2. Machine Protection concepts, including interlock system layout and protection elements**
- 3. Availability and maintenance studies**
- 4. Circuit protection for warm and cold magnet circuits**
  - This work is starting 'now'. Core responsibility and competence of the MPE group.
  - This will follow from point 1 – strategy to be defined soon– also playing a coordinating role in the sector via the MP Task Force.
  - Working on Availability simulation for FCCee for 2 years, using proven methods and tools.  
Very important results for the RF system of the collider obtained, work ongoing concerning polarisation and maintenance strategies.  
Working on modelling of all hardware systems and the different operational concepts. Important lessons to be learned which can really affect the R&D and hardware design at this moment in time.
  - Initial work done for FCC-hh, this will impact the tunnel layout.  
Missing parameters for the FCC-ee (both warm and cold magnets)

# Infrastructure definition

- **For the MPE hardware initial (cabling) needs have been provided. This is not final as there is no hardware specification nor design**
- **The most important constraint will come from the sc magnet protection of FCChh. An initial study of the magnet protection has been made**
  - A comparison with the FCCee tunnel cross-section needs to be made by ‘integration’
  - Surface space reservation should be minor
  - Cryogenic layout to be studied

# Challenges

- **Machine Protection**

- Ultra fast failure modes for a very large machine in a strong radiation environment using ultra high energy density beams – this IS a challenge
- After making an inventory and first analysis we need to develop a hardware design. We have 20 years to make it work, R&D most likely required.

- **Availability**

- This is the moment to perform availability (= luminosity delivery) simulations. The context is highly complex and challenging. The study needs a global system overview. Hardware groups must be open to point their R&D towards where it will have the most significant impact.

- **Circuit Protection**

- We need the FCC-ee circuit and magnet parameters to start with
- We have basic FCC-hh circuit parameters which need to be integrated in the global magnet and cryogenic design

# Organisation

- **The present FCC and FCCee organisational structure is not very clear to me**
  - Who reports to who?
  - Where do I find official parameters, coherence, statuses of studies? (may be this is just my ignorance)
- **Defining an FCC structure which is close to the ATS organisational structure most likely simplifies matters**



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