



Contribution ID: 37

Type: Poster

## Challenges for the FCC-ee Machine Detector Interface alignment and monitoring

The Future Circular Collider (FCC), a 93km long circular collider, is one of the projects under study at CERN for the post LHC era. Its goal will be to search for new particles while confirming and refining measurements on known ones such as the Higgs Boson. In order to reach the designed luminosity and the requested precision of the collider, the Machine Detector Interface (MDI) and more precisely the components inside, such as the final focusing quadrupoles, LumiCal, screening and compensation solenoid, will need to be extremely precisely aligned and monitored. The alignment of the accelerator components of the MDI is always difficult due to the “hole” in the accelerator (in order to have detector components around the interaction point) which also implies a “hole” in the alignment system. One needs to go around the detector in order to align both sides of the accelerator as no line of sight through the detector is allowed. Though, the MDI currently designed is an innovative and elegant solution, having the last parts of the accelerator supported by a skeleton to hang in cantilever configuration inside the detector. This design raises additional challenges as it will limit the type of sensors usable in these conditions (lack of space, radiations, cryogenic cold, magnetic fields). Moreover, the first known alignment requirements for the inner components are extremely tight and current alignment systems cannot reach these values. This paper will underline these challenges and show why they represent difficulties for the FCC-ee MDI alignment. Design, sensors, technology, and alignment tolerances will be discussed.

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**Track Classification:** Survey & Alignment