FCC-EE IR MOCK-UP

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Introduction

- Design of the Interaction Region is critical for the entire collider performance.
- Design of the IR is also important for detector design (background, acceptance, access to internal detector parts, etc.).
- This R&D activity is at a proposal stage.
- Discuss the proposal and the main goal and objectives of this R&D.

Main deliverable goals

Finalization of the IR system engineering.
Addressing all the issues related to the assembly like the

- conflicts between components
- difficulties in assembling these components
- establishing the optimal construction sequence
- finalizing the dimensioning of all the components as close as possible to the final requirement of design
- address all critical issues related for instance to the overall mass of the systems, like deformation, long and short-term stability of the system.

Address all issues related to vibrations and possibly include ad hoc passive and active systems to reduce such vibrations developed in the framework of FCCIS collaboration with LAPP.
Update of the executive drawings according to the acquired know-how.

If deemed important or critical, realize also with the 3d printer technique elements attached or possibly interfering with the IR mock-up (e.g. rigid carbon supporting tube with endcaps, compensating solenoids, luminosity monitor, cryostat).

Prototypes

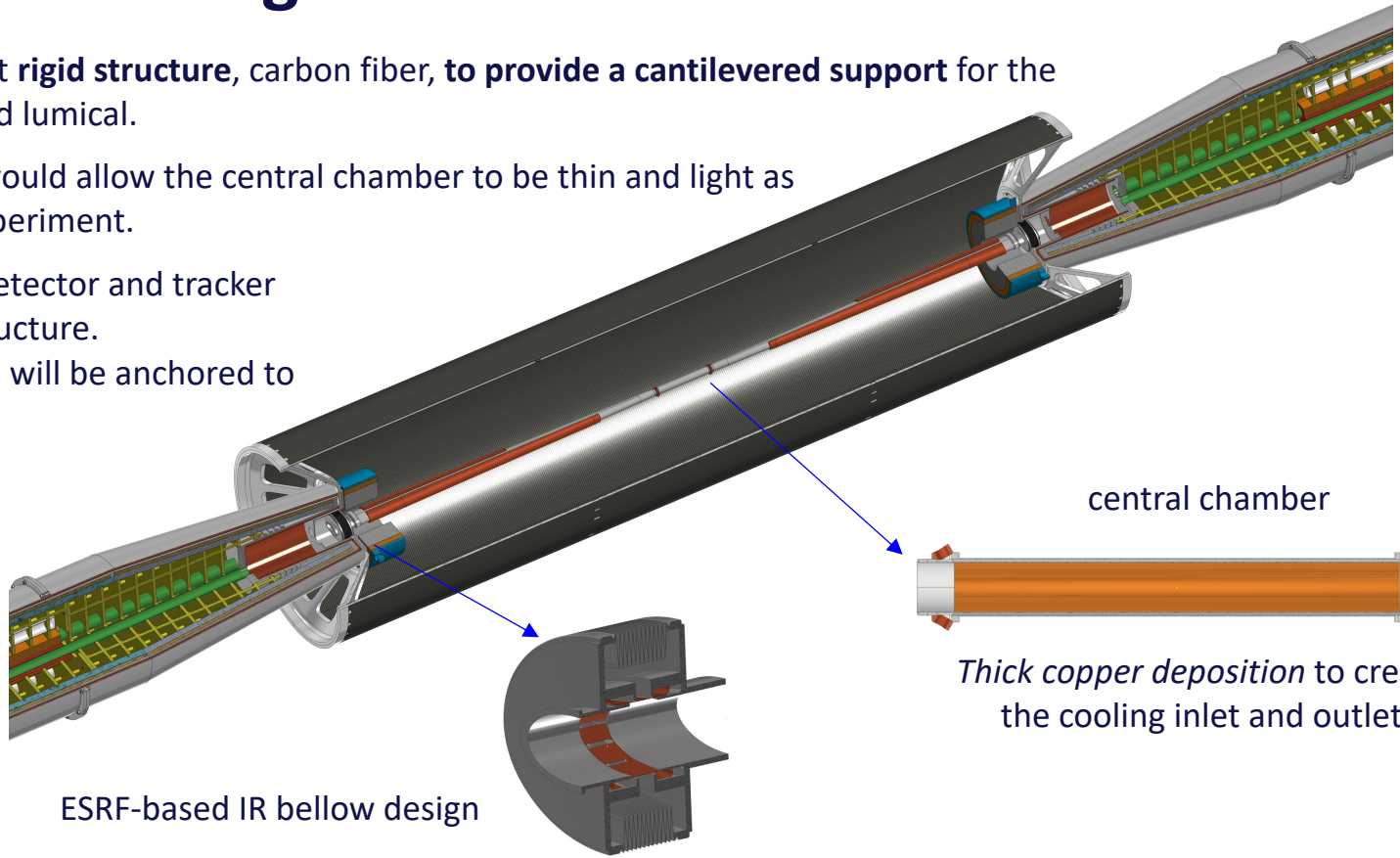
- Central chamber with the cooling system
- Bellow
- Remote flange
- 3D printed mock-ups of critical elements
- Supporting structures
- Vacuum chamber with cooling system until the end of QC1

Mechanical Design

Proposed lightweight **rigid structure**, carbon fiber, **to provide a cantilevered support** for the vacuum chamber and lumical.

The rigid structure would allow the central chamber to be thin and light as requested by the experiment.

Support for vertex detector and tracker will be inside the structure.
This supporting tube will be anchored to the detector.



Remark

If we limit the proposal to the central chamber, bellow and welding it will be prototyping, not a mock-up.

If we aim at maximizing the gain in terms of lessons/effort, then I believe it is worth to:

- aim at the **definition of the weight and space of the IR quad and cryostat** to produce a sample in metal, **allowing to test vibration sensors** which could be developed in the meanwhile at LAPP
- propose a **joint effort** in collaboration with
  the CERN vacuum group for the **remote vacuum connection**
  the CERN beam instrumentation group for the **IR BPM** design, and prototype?

Final Remark

The idea is to base the FCC-ee IR mock-up at INFN-LNF.

This proposal can become a mock-up only if there a collaboration between INFN, CERN, LAPP and possibly other institutes.

By the way:

This is the spirit of the entire FCC-ee MDI activity