

The Future Circular Collider (FCC) study aims at developing a conceptual design for a post-LHC particle accelerator research infrastructure in a global context, with an energy significantly above that of previous circular colliders as LHC and SPS.

CERN's Integration Office is in charge to study and integrate the machine and services equipment within the new machine tunnel and detector caverns and belong underground structures. The new tunnel has a circumference of 97.75 km (Figure 1), almost four times the size of the present LHC. In addition to the machine tunnel. Approximately 8km of by-pass tunnels, 22 shafts, 16 large caverns and 12 new surface sites are required. Large caverns are required at each of the four points (A, B, G and L) which house the experiments. These caverns have a maximum clear space of 35m, which is at the limit of what is possible, given the ground conditions. At each of the access points around the ring, a service cavern with a clear space 25 m is required. These caverns are connected to the service via shafts with diameters ranging from 10 m to 18 m. Auxiliary structures in the form of by-pass tunnels and alcoves are required to house electrical equipment and connection tunnels. At least one of the access shafts requires a diameter of 18 m to accommodate magnet lowering. The possibility of having an elliptical shaft with a maximum length of 18 m, in place of a circular shaft of diameter 18 m, is under consideration.

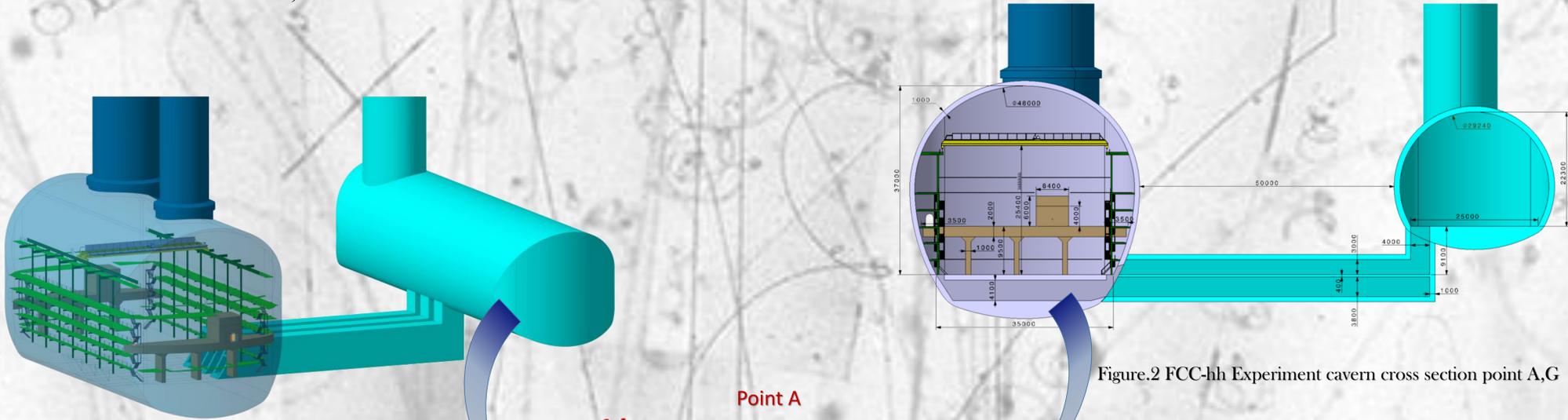


Figure.2 FCC-hh Experiment cavern cross section point A,G

Figure.3.1 FCC-hh Experiment cavern isometric view point A,G

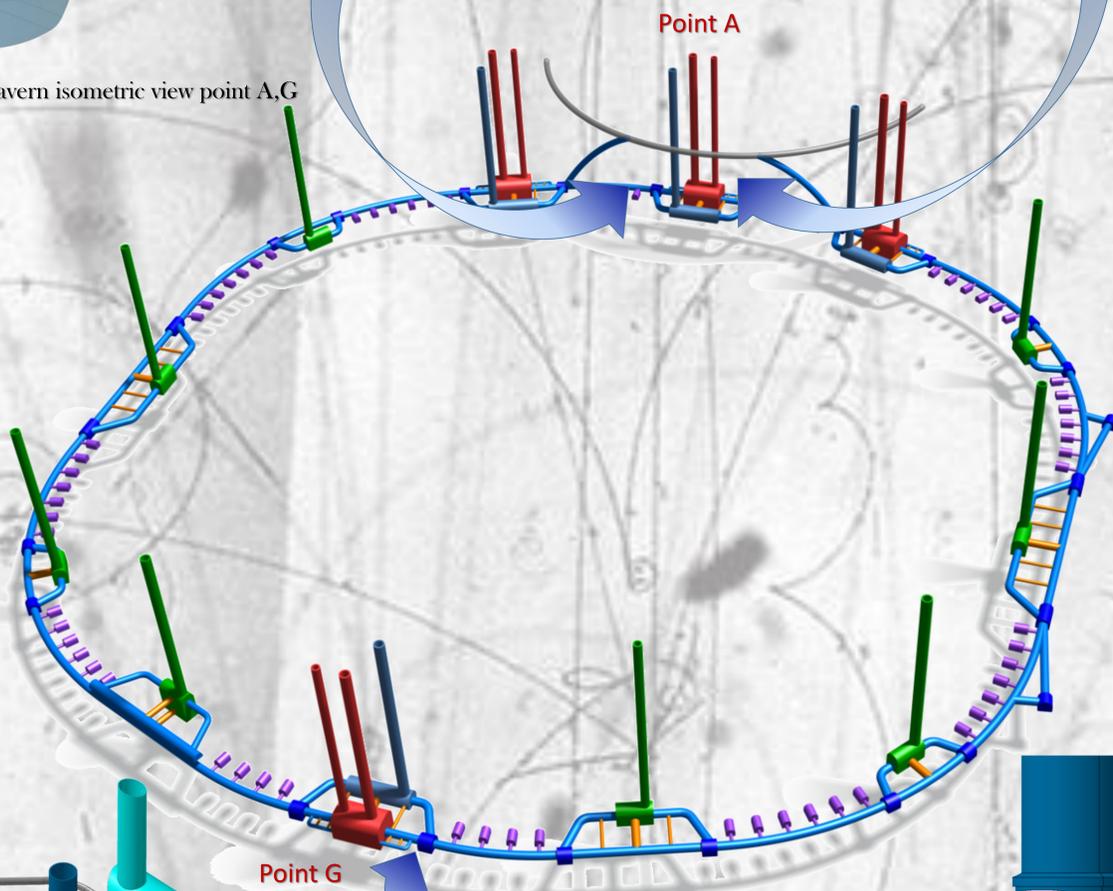


Figure.1 FCC-hh schematic 3D model (Courtesy of Angel Navascues)

Figure.3.2 FCC-hh Experiment cavern isometric view point A,G

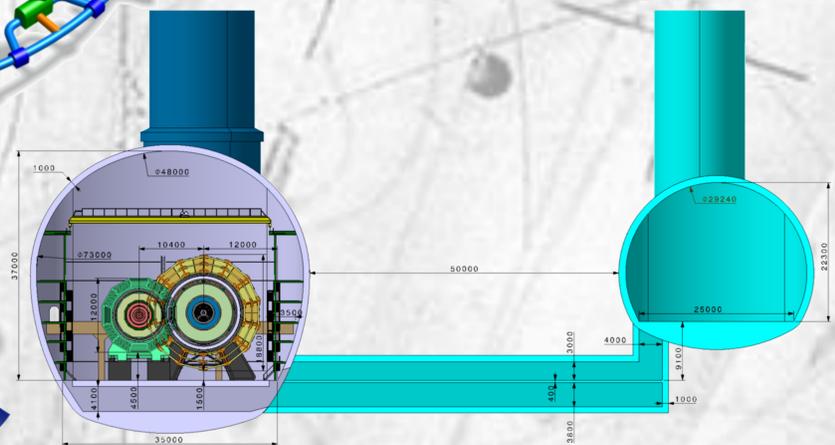


Figure.4 FCC-hh Experiment cavern cross section with FCC-ee and FCC-hh detector point A,G

The dimensions for the caverns at A and G (Figures 2,3) are, 66m x 30m x 35m (L x W x H). The caverns will be constructed at depths of up to 274 m in the molasses layer. A service cavern with dimensions of 100m x 25m x 15m (L x W x H) is required adjacent to the experiment caverns at points L, A, B and G, and also at the remaining 8 access smaller in the other points. This will be constructed in a similar manner to that for the experiment caverns. At the experiment points, the spacing between the two caverns is 50 m as this allows the structures to be independent and hence minimizes the structural support needs and reduce the risk and complexity during construction.

The experimental cavern will house the FCC-ee detector with size 12 m in diameter and later on will be replaced by FCC-hh detector with size of 18 m in diameter. The cross section of the FCC-hh Experimental cavern (Figures 4) shows the positions of both detectors with a distance of 10.4 m between them.