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## **Wed-Af-Po3.17-08 [36]: Mechanical behaviour of the HL-LHC beam screen during a quench test campaign of the MQXF short model magnet**

*Wednesday 25 September 2019 14:00 (2 hours)*

In the framework of the High-Luminosity Large Hadron Collider (HL-LHC) project, a complex assembly, known as the beam screen, will be installed by 2024 in the aperture of the new Nb<sub>3</sub>Sn HL-LHC triplet magnets (MQXF) nearby the ATLAS and CMS experiments. The beam screen is an octagonally shaped pipe that ensures that the vacuum conditions, required for the stability of the beam, are met. It also shields via tungsten-based inserts the 1.9 K magnet cryogenic system from the heat loads and damage to the magnet coils that would otherwise be induced by the highly penetrating collision debris.

The mechanical behaviour of the beam screen during a magnet quench needs to be carefully studied. The distribution of Lorentz forces induced in the assembly is closely related to the magnet protection system, which is composed by conventional quench heaters and the Coupling-Loss Induced Quench (CLIQ) system.

To this purpose an innovative coupled multiphysics model has been developed as a tool to support the design of the beam screen. The model combines the magnetic, thermal and mechanical equations in a dynamic way. A dedicated test campaign has been conducted at the CERN's magnet test station to assess the effects of magnet quenches on the beam screen inserted in an MQXF short model magnet. The beam screen assembly has been instrumented with strain gauges, special probes and optical fibres.

This paper presents the measurements on the beam screen and a comparison with simulations.

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