Contribution ID: **164** Type: **Poster**

C3Po1A-01: Cryogenic Testing of HL-LHC Q1/Q3 Cryo-Assemblies at Fermilab

Wednesday 21 May 2025 09:15 (1h 45m)

Fermilab is conducting horizontal cryogenic testing of Q1/Q3 Cryo-Assemblies for the high-luminosity LHC upgrade (HL-LHC). Cryo-Assemblies are installed on the upgraded Fermilab horizontal test stand previously used for testing the LHC inner triplet quadrupoles. The cryogenic process requirements of these tests include controlled cool-down and warm-up with a 100 K maximum temperature differential between the two ends of the cold mass, operation of a 1.3 bar, 1.9 K bath of subcooled superfluid helium during power testing and magnetic measurements, and operation at pressure up to 18 bar with full helium recovery after a quench. This paper presents the operational experience gained from the first tests as well as operational improvements for subsequent tests.

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Session Classification: C3Po1A - Cryogenic Test Facilities