MT25 Conference 2017 - Timetable, Abstracts, Orals and Posters



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Mechanical Analysis of the Short Model Magnets for the Nb3Sn Low-Beta Quadrupole MQXF

Monday 28 August 2017 12:00 (15 minutes)

During the development of MQXF, the new Nb3Sn quadrupole to be used in the LHC inner triplets for the Hi-Luminosity upgrade, three short models were tested: MQXFS1, MQXFS3 and MQXFS5. These models differ in the use of thin or thick laminations for the iron components, and in the coil strands, RRP or PIT. In the MQXF design, the azimuthal prestress is provided at room temperature by means of the bladder-key technology, and it is further increased during the cooldown by the differential thermal contraction of the various components. Four aluminum rods provide the longitudinal prestress. Both systems allow for a flexible control of the amount of prestress applied. As a consequence, it was possible to test the models exploring different azimuthal and longitudinal prestress conditions, in an attempt to understand their impact on the magnet performances. This paper studies the mechanical behavior of these short models, also providing the strain and stresses measured by means of strain gauges installed on the aluminum shell, on the winding poles and on the rods. Finally, the paper compares the measures with the results from FE models.

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