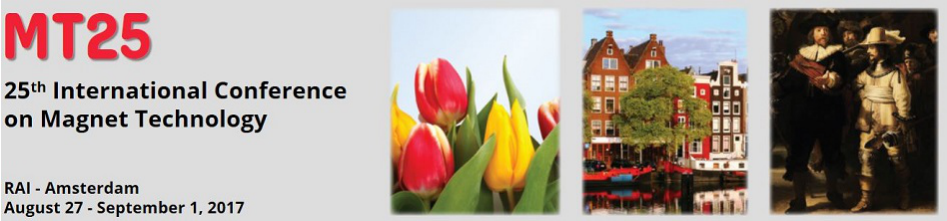

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Training of the main dipoles magnets in the Large Hadron Collider towards 7 TeV operation

Monday, 28 August 2017 11:00 (15 minutes)

During 2016, one quarter of the LHC main dipoles have been powered above the 7.7 T operational field, to reach a field of the order of 8.1 T. These tests were done to confirm the extrapolation of the training behaviour based on a Gaussian tail of the quench distribution. In this paper we show that the training is compatible with the expectations, but on the lower side of the extrapolation. These tests also allowed to assess the quantity of magnets quenching twice during the training, which is shown to happen in a 10% fraction of the production. Moreover, one eight of the LHC was warmed up to replace a magnet, adding precious information on the magnet behaviour on successive trainings. We then propose an asymmetric distribution to better model the quench distributions. Based on these new elements, we show that around 500 quenches are expected to reach the operational field of 8.3 T for the whole LHC dipoles (corresponding to 7 TeV operational energy). We show that very little correlation is found between the training in the installed magnet and individual test in virgin condition (first cool-down). On the other hand, a better correlation is found with individual test after a thermal cycle (second cool-down); unfortunately, the uneven sampling of these test (done on 10% of the production) did not cover the production showing slower training in the LHC.

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