

Physics Motivations for Level-1 track triggering at LHC and future HEP experiments¹

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The central mission of the High Luminosity LHC (HL-LHC) physics programme will include measuring the properties of the recently discovered Higgs boson and continued searches for New Physics beyond the Standard Model. Higher luminosity will extend the discovery mass reach, allow more sensitive searches for signatures of new physics, and enable studies of any newly found particles and their interactions.

The very high luminosity and event pile-up environment of the HL-LHC makes this goal a major challenge for the necessary detector upgrades. Both ATLAS and CMS are pursuing a programme of trigger upgrades aimed at maintaining the present sensitivity for precision measurements of the properties of the new boson, as well as its ability to search for and characterize a broad range of possible new physics phenomena at the TeV scale, up to the highest luminosity of the HL-LHC upgrade. An integral part of this this detector upgrade programme is the addition of a tracker trigger at the very early stage of event-selection.

In this lecture I will outline the general core physics programme of the LHC (past, present, and future) and then discuss how a track trigger can help to successfully execute this ambitious physics programme.