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The CMS Level-1 Trigger Upgrade for the HL-LHC

High Luminosity LHC will expand the physics reach of the CMS experiment, but only if the data can be efficiently collected. CMS is developing a new Level-1 trigger system to handle the increased data rate. An essential new feature is the availability of reconstructed tracks for every bunch crossing that can be used by the trigger system's decision making process, allowing new trigger options and lowering the trigger rate to a manageable level. Several systems within the level-1 trigger are being designed to take advantage of this new information. One system will produce physics objects and quantities using only tracking information (i.e. vertices, track jets, etc.). A different system will run the particle-flow and PileUp Per Particle Identification algorithms. The design and challenges of an all-FPGA, time-multiplexed hardware system dedicated to running these algorithms will be discussed.

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