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# Simulation and Reconstruction Upgrades for the CMS experiment

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Over the past several years, the CMS experiment has made significant changes to its detector simulation and reconstruction applications motivated by the planned program of detector upgrades over the next decade. These upgrades include both completely new tracker and calorimetry systems and changes to essentially all major detector components to meet the requirements of very high pileup operations. We have untaken an ambitious program to implement these changes into the Geant4-based simulation and reconstruction applications of CMS in order to perform physics analyses to both demonstrate the improvements from the detector upgrades and to influence the detector design itself. In this presentation, we will discuss our approach to generalizing much of the CMS codebase to efficiently and effectively work for multiple detector designs. We will describe our computational solutions for very high pileup reconstruction and simulation algorithms, and show results based on our work.

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