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A palette of fast simulations in LHCb

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LHCb is one of the major experiments operating at the Large Hadron Collider at CERN. The richness of the physics program and the increasing precision of the measurements in LHCb lead to the need of ever larger simulated samples. This need will increase further when the upgraded LHCb detector will start collecting data in the LHC Run 3. Given the computing resources pledged for the production of Monte Carlo simulated events in the next years, the use of fast simulation techniques will be mandatory to cope with the expected dataset size. A number of fast simulation options are already available or under development to complement the full simulation of the LHCb detector based on Geant4. They include simulating a subset of the generated particles, simplifying the detector geometry, re-using the underlying event, replacing the detailed simulation of the calorimeter with a faster version based on hit libraries, or using a fully parametric simulation of the detector. We present the available options, describe their applications and discuss the future developments. We also mention how we intend to make the different options transparently available in the LHCb simulation framework.

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