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Validation of Monte Carlo Simulations for an analysis chain in H.E.S.S.

Imaging Air Cherenkov Telescopes (IACTs) indirectly detect very high energetic (VHE) gamma rays. They observe the Cherenkov light emitted in electromagnetic shower cascades the gamma rays induce in the atmosphere. A precise reconstruction of a primary photon's energy and the source flux depends heavily on accurate Monte Carlo (MC) simulations of the shower propagation and the detector response, and therefore on adequate assumptions about the atmosphere at the site and time of a measurement.
Here, we present the results of an extensive validation of the MC simulations for an analysis chain of the H.E.S.S. experiment with special focus on the recently installed FlashCam camera on the large 28 m telescope. One goal of this work was to create a flexible and easy-to-use framework to facilitate the detailed validation of MC simulations also for past and future phases of the H.E.S.S. experiment.
Motivated by the underlying physics, the detector simulation and the atmospheric transmission profiles were gradually improved until low level parameters such as trigger rates matched within a few percent between simulations and observational data. This led to instrument response functions (IRFs) with which the analysis of current H.E.S.S. data can ultimately be carried out within percent accuracy, substantially improving earlier simulations.

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