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Towards highest and lowest energies for the High Energy Stereoscopic System (H.E.S.S.) in Namibia

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Abstract : The High Energy Stereoscopic System (H.E.S.S.) is a gamma-ray observatory located in the highlands of Namibia, operational since 2002. It has undergone several upgrades to maintain scientific relevance and withstand the desert environment. H.E.S.S. houses CT5, the largest gamma-ray telescope, which has been equipped since 2019 with FlashCAM, a new prototype camera designed to replace the H.E.S.S. II camera and for future deployment at the Cherenkov Telescope Array Observatory (CTAO) in Chile.

FlashCAM is a fully auto-calibrating camera with a progressive gain channel, introducing challenges for integration into the H.E.S.S. software due to its novel operational principles. The camera has been adapted for use in one of H.E.S.S.'s two primary analysis frameworks, HAP Analysis, while its integration into the second analysis software, ParisAnalysis, is still pending. ParisAnalysis's semi-analytical reconstruction model, Model++, requires full characterization of the camera's electronics noise from dark and observational runs, necessitating significant modifications to the calibration pipeline and its advanced algorithms.

The complete integration of FlashCAM into the ParisAnalysis software and Model++ is essential, as it will expand the analysis capabilities to lower energies for extragalactic science, unlocking five years of previously unanalyzed CT5 data. Additionally, this integration will enable cross-analysis using both ParisAnalysis and HAP pipelines, a requirement for the H.E.S.S. collaboration, facilitating the release of the first FlashCAM results and validating the camera's performance for the future CTAO.

TAGS : High Energy Astrophysics, IACT, Gamma-rays, High Energy Stereoscopic System , Instrument calibration.

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