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LHAASO-WFCTA Optical System Optimization for High Precision Cherenkov Shower Reconstruction

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Wide Field-of-view air Cherenkov Telescope Array (WFCTA) is an essential component of the Large High Altitude Air Shower Observatory (LHAASO). WFCTA comprises 24 movable identical telescopes specialized for measuring the energy spectrums of the cosmic ray ingredients. In this paper, we describe the synthesis optimization design of the optical system, including the mirror segments, the camera and the Winston cone light collectors for individual telescope. We also evaluate the imaging performance through Monte Carlo simulation as well as spot scanning experiments. Finally, based on these properties, a high precision Cherenkov image reconstruction technique is discussed, which is implemented to improve the imaging resolution so as to fulfill the precise Cherenkov shower reconstruction.

Collaboration

LHAASO

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