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A method to filter out high rate noises in air shower reconstruction for the LHAASO-WCDA project

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The Large High Altitude Air Shower Observatory (LHAASO) will be constructed at Mt. Haizi in Sichuan Province, China. Among several detector components of the LHAASO, the Water Cherenkov Detector Array (WCDA) is of great importance for low-to-middle energy gamma ray astronomy. The WCDA has an area of 90,000 m2 in total, which is sub-divided into 3600 cells by curtains, with a PMT resided in each cell. As located at 4400 m a.s.l. and governing 25 m2 water area, the single rate of a PMT can reach as high as 50 kHz, bringing a big trouble for the reconstruction of shower events. In this study, an initial reconstruction method aiming to deal with these high rate noises is developed. This method is tested with the Monte Carlo simulation data, showing a very good efficiency in filtering out noises, while most of the real shower signals are remained. This method is proposed to be applied for the future LHAASO-WCDA project, in a stage of the online processing. It can be generalized and used by other air shower experiments as well.

Collaboration

LHAASO

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