

# Summary of the paper “Sensitivity estimation of LHAASO-WCDA for observing GLE events”

Yunfeng Zhang, Huanyu Jia\*, Yonglin Feng

School of Physical Science and Technology, Southwest Jiaotong University, Chengdu 610031, China

\*E-mail: hjjia@swjtu.edu.cn

Ground Level Enhancement (GLE) events of solar cosmic ray refer to the sudden, sharp and short-lived enhancement of ground level energetic particles with energy above 450 MeV generated from solar flare and coronal mass ejection (CME). The study of GLE events is not only an important sample to understand the cosmic rays, but also helpful to the prediction and early warning of catastrophic space weather. The Large High Altitude Air Shower Observatory (LHAASO), a multi-component instrument, is located at high altitude (4410 m a.s.l.) in Daocheng, Sichuan province, P.R. China, with the one of the main aims to observe GLE events. Whether the LHAASO experiment can observe high-energy GLE events, the first problem to be solved is the sensitivity estimation of GLE events observed by the LHAASO experiment.

In this work, we estimate the sensitivity of the LHAASO-WCDA experiment to observe GLE events under different zenith angles, observation energies and GLE time durations by using proton observational peak energy spectrum of 13 GLE (GLE40-GLE52) events in 22 solar cycles. Our calculation results of analysis are as follows:

1. The sensitivity of LHAASO-WCDA to observe GLE events becomes terrible and I/F decreases with increasing zenith angle. When the zenith angle is up to 45 – 60 °, however, the I/F is still greater than 1. So LHAASO-WCDA can also detect GLE events over larger zenith angle ranges.

2. The ability of LHAASO-WCDA to detect GLE events decreases with the increase of the observed energy. But when the observed energy is more than 1TeV, I is 30 times than F, or even higher.

3. The possibility of LHAASO-WCDA to observe GLE events become larger with time duration.

In this paper, the sensitivity of LHAASO-WCDA to observe GLE events is estimated, the result shows that LHAASO-WCDA can observe GLE events with energy higher than 1 TeV. It is worth noting that our results are obtained by extrapolation of the energy spectrum of GLE events, this means that the energy spectrum of the solar energetic particles remains unchanged at higher energies.