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# Sensitivity estimation of LHAASO-WCDA for observing GLE events

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37<sup>th</sup> International Cosmic Ray Conference (ICRC 2021)

July 12th – 23rd, 2021 Berlin, Germany



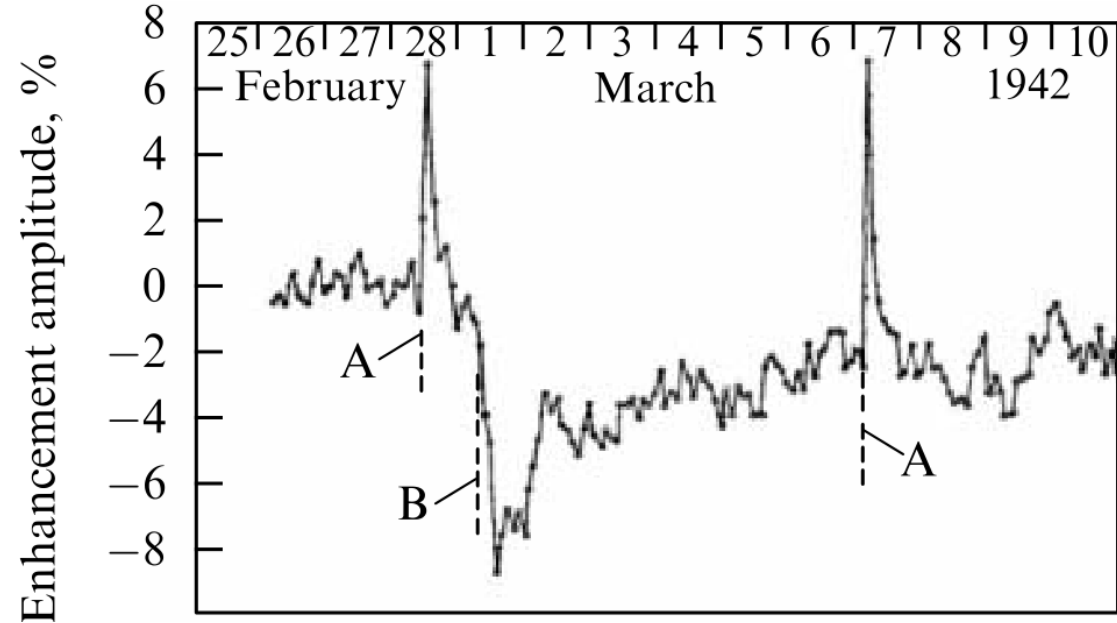
# Outline



1. GLE events
2. Calculation process
3. Calculation results and discussion
4. Conclusion



# 1. GLE events



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

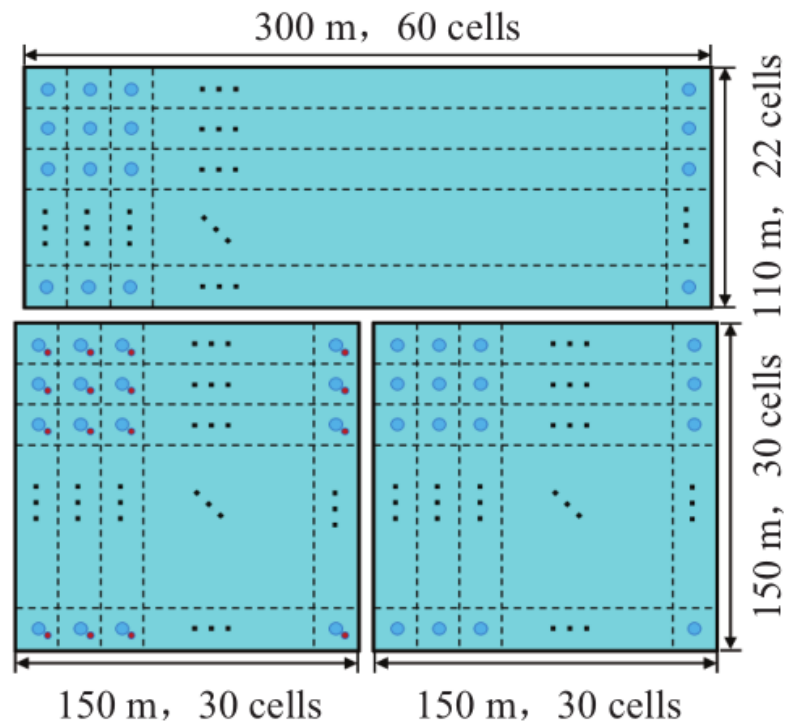
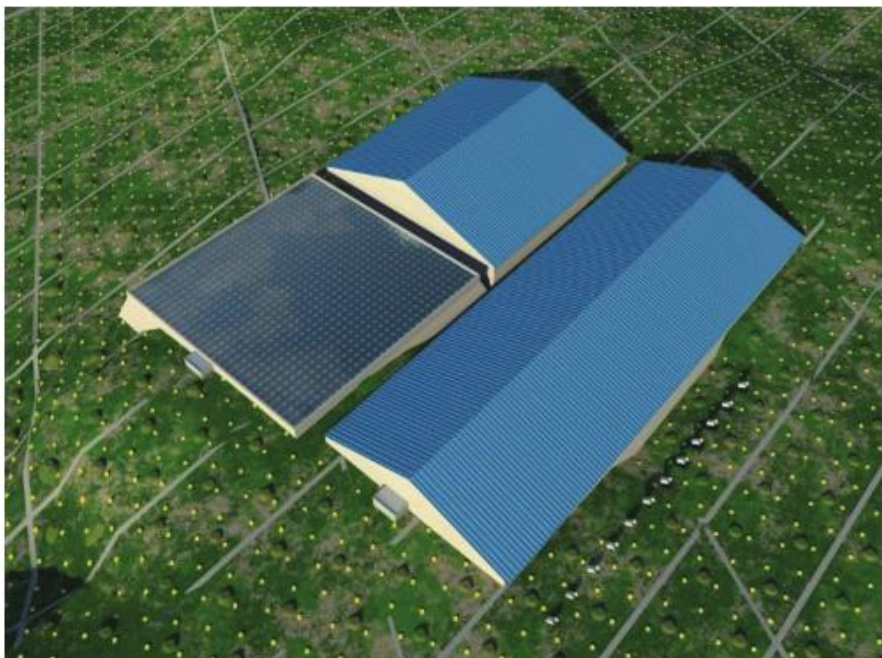
The study of GLE events is not only an important sample to understand the cosmic rays, but also helpful to the prediction and early warning of catastrophic space weather.

LHAASO-WCDA ?

Sensitivity ?



## 2. Calculation process



1. Calculate background(GCR) count  $N_{\text{GCR}}$  of LHAASO-WCDA experiment.
2. Calculate the minimum count  $N_{\text{GLE}}$  required for  $5\sigma$  observation of GLE events.
3. Calculate the normalization constant coefficient  $K$ .
4. Calculate the sensitivity  $F$  (The sensitivity  $F$  is the minimum flux required by LHAASO-WCDA to observe GLE events).



# 3. Calculation results and discussion



I: GLE events generate solar energetic particle flux F: the sensitivity(observe GLE events ) of LHAASO-WCDA experiment

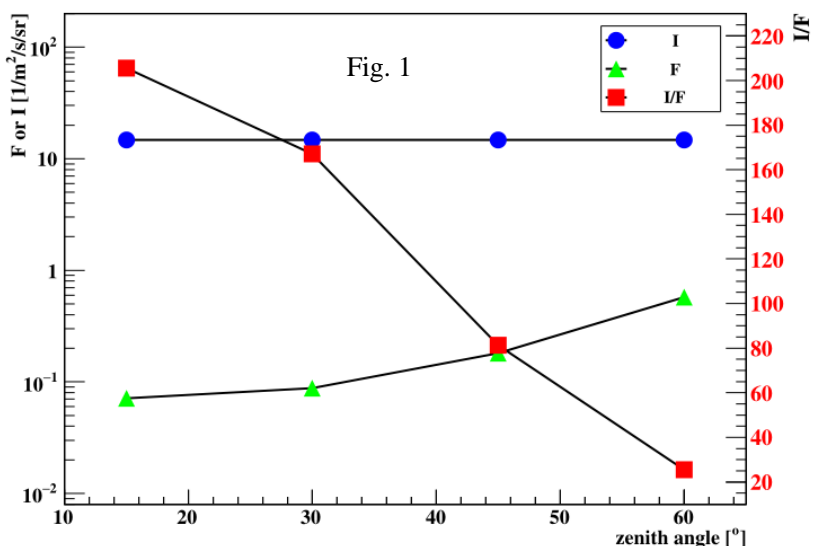


Fig. 1 shows F (green triangle), I (blue dot) and I/F were calculated over different zenith angle ranges when the lower limit of WCDA observation energy is 127GeV.

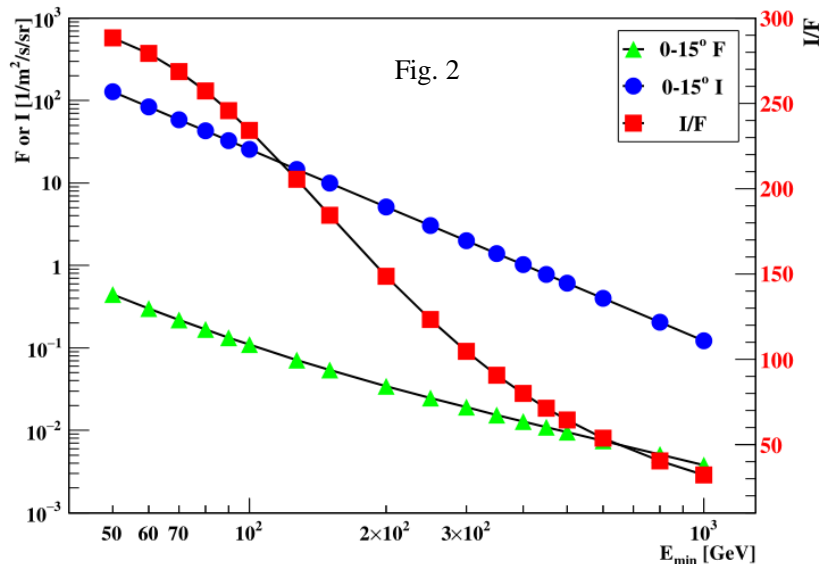
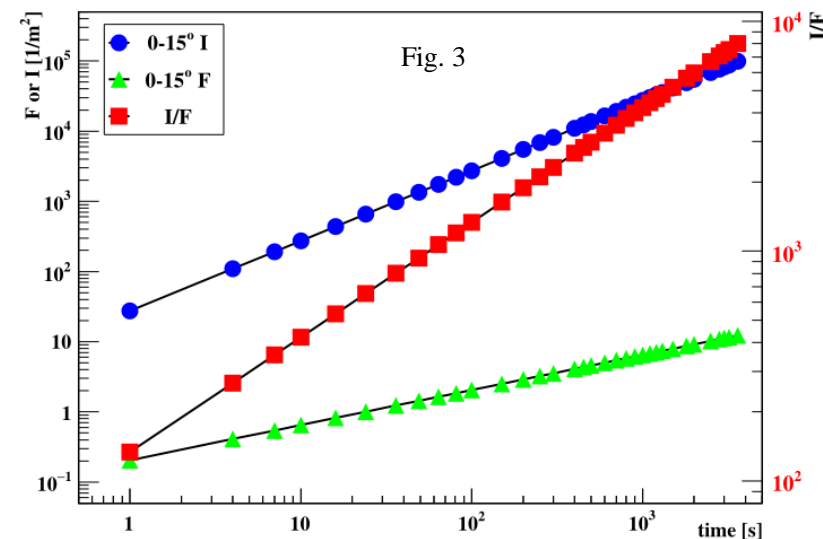


Fig. 2 shows F, I and I/F as a function of the observed energy when the zenith angle is 0–15°



Dependence of F , I and I/F on the time duration are shown in Fig. 3 when the zenith angle is 0–15° and minimum observed energy is 50 GeV.



## 4. Conclusion



- 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.

Thanks !