GRAND-proto scintillator array

GOU Quanbu Institute of High Energy Physics, CAS

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1. Purpose



Layout of the previous hybrid experiment

With the help of the smallest scintillator array (composed of 3 scintillators, in left figure), TREND experiment has shown that EAS could be detected by standalone and self-triggered radio arrays (Astro. Part 34 (2011)). Again, an array of 21 scintillator detectors is to be developed and installed on site to perform an offline cross-check for the EAS radio emission.



GRAND-proto layout . ■ is scintillator detector, ▲ is 3-arms antenna, and the white diamond is 21 CMA antenna.

More over, the results obtained with the two independent experiments could be used to confirm the polarization characteristics of the EAS radio emission, to get new criteria for selecting EAS candidates, to find new methods in rejecting background and to reduce the uncertainty of the experiment results.

2. Status of the scintillator array

• Prototype

(of scintillators, detector support, HV unit, and detector hut have been developed)

Installation

(The Scintillator array will be installed on site between the summer of 2015 and 2016)

Study on the prototype detector

- Plastic scintillator
 - Type: EJ-200
 - Size:707mm*707mm*20 mm
- Reflective material:

– Tyvek 1082D







- PMT, its base and sleeve.
- Detector support: its inclined angle is adjustable.







Detector support with 5 fixed adjusting (zenith) angles: (1) Original position (0 mm), corresponds to 59.1° . (2) Second one (45 mm), 54.1° ; (3) Third one (91 mm), 49.2° ; (4) Fourth one (136.5 mm), 44.2° ; (5) Fifth one (182 mm), 39.2° .



Performance of the PMT



Performance of the prototype scintillator

Time resolution is $^{\sim}$ lns.

- Non-uniformity is not greater than 35%.
- The data are in good agreement with the simulation.







Summary

 In order to perform an off-line cross-check for the EAS radio emission, an surface array with 21 scintillator detectors is requested.

 The prototype scintillator (together with its support and other necessary supplementary components) has been developed. The Scintillator array will be installed on site between the summer of 2015 and 2016.

Thanks for your attention!