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Feasibility of VHE gamma ray detection by an array of Imaging Atmospheric Cherenkov Telescopes using the fluorescence technique

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The last 20 years have seen the development of new techniques in Astroparticle Physics providing access to the highest end of the electromagnetic spectrum. It has been shown that some sources emit photons up to energies close to 100 TeV. Yet the fluxes of these photons are incredibly low and to go higher in energy new detection techniques are needed.

A new technique that would use the new generation of Cherenkov Telescopes, i.e., the Cherenkov Telescope Array (CTA), is proposed to push further the energy frontier. It is based on the detection of the fluorescence radiation emitted in Extensive Air Showers (EAS), a successful method used in ultra-high-energy cosmic ray experiments, like the Pierre Auger Observatory. It would require minor modifications of the hardware currently being developed for the CTA and would not imply significant extra cost during its planned operation.

We study an array of Cherenkov Telescopes of 12 meters diameter, with characteristics similar to some of the proposed components of CTA, making some basic assumptions on its behavior. Using a toy model for the development and detection of gamma-ray induced EAS we compute the approximated effective areas and exposures at trigger level for different energies and incidence angles. The results show that at trigger level the fluorescence technique might be competitive at the highest energies. It remains to be proved if an efficient gamma/hadron separation can be achieved under those conditions.

Collaboration

– not specified –

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