ABSTRACT

The HEGRA–collaboration is operating a system of imaging atmospheric cherenkov telescopes for the search of sources of TeV–γ–rays (see O.G. 10.3.17). Air showers are observed in stereoscopic mode with several telescopes simultaneously. To trigger the telescope system a versatile multi–level trigger scheme has been implemented, which allows a significant reduction of the energy threshold with respect to single telescopes. The technical implementation of this trigger scheme, and the performance of the system trigger are described.

INTRODUCTION

Imaging atmospheric Cherenkov telescopes (IACT) have been proven to be the most powerfull instruments in TeV–γ–ray astronomy. The high sensitivity of these instruments results from the large effective collection area, governed by the size of the light pool of air showers and from an effective hadron suppression, achieved by the imaging technique. Further improvements of the Cherenkov technique have been obtained by coupling several telescopes to a system for stereoscopic observations of air showers. The HEGRA–collaboration has installed such a stereoscopic system during the last two years and first measurements show very encouraging results (Daum et al. 1997).

In order to fully exploit the advantages of stereoscopic observations, already on the trigger level only events should be selected, where at least two telescopes give useful images. Furthermore the trigger scheme should suppress as much as possible background triggers, generated by the light of the night sky, by local muons, and also by hadronic showers, while maintaining high efficiency for genuine γ–showers. In addition, it should allow to operate the system at a low energy threshold. Besides these physiscs requirements, technical aspects have to be taken into consideration, like e.g. the limited bandwidth of typical data acquisition systems of IACTs of some tens Hz. Finally the trigger should be controllable by software in order to be able to quickly adjust the proper trigger conditions.