

Status of the High Resolution Fly's Eye Detector: Operation and Installation

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Abstract

The Stage-I HiRes detector consists of two rings of detectors separated by 12.6 km (each with 2π coverage at low elevation angle). The first of these two sites, called HiRes I has been taking data since 1997.

Some of the major milestones associated with the construction and operation of the emerging detector are discussed.

1 Introduction

The High Resolution Fly's Eye detector consists of an array of mirror-PMT cluster assemblies which are used to observe nitrogen fluorescence from extensive air showers. The mirrors used are each formed from four segments in a clover-leaf pattern. The resulting mirror is about 2 m in diameter and is (optically) spherical with a radius of curvature of 474 cm.

The clusters are formed from 256 hexagonal PMTs in a hexagonal close pack (honey-comb) geometry. The cluster size is 16 by 16 PMTs and it is divided (for trigger and electronics purposes) into 16, 4×4 tube, sub-clusters. The full cluster therefore subtends a solid angle approximately $16^\circ \times 16^\circ$.

2 The Present

The HiRes I site is composed of 22 detectors arranged in a single ring geometry. The 22 mirrors subtends almost 2π in azimuth but only 16° in elevation. If one makes the cut that a significant portion of the shower should be observed including the shower maximum, this is equivalent to restricting observations to distant, energetic showers (10^{19} - 10^{21} eV and higher). This detector has a instantaneous monocular aperture of 1000 km²str at 100 EeV.

The full 22 detector array was complete and taking test data by early July 1997. An example of an event from this detector is shown in figure 1 which comes from our event display. In this figure, the ring of trapezoids around the perimeter represent the full ring of HiRes-1 detectors.

At HiRes II all 42 mirrors worth of FADC electronics are due to be completely installed at the Camel's Back site by end of July, 1999. This site has two full rings of mirrors all of which have been installed and aligned. ALL 14000 PMTs have already been scanned for active area and gain and have been installed in the mirror clusters and hooked up to the HV system We have begun to take stereo data with a subset of these mirrors and the HiRes I detector.

3 Conclusion

The HiRes I detector is in stable data taking mode and has accumulated close to two years of monocular data. The HiRes II site installation and construction are complete and shakedown running has begun. We anticipate stable stereo data taking will commence in the fall of 1999.

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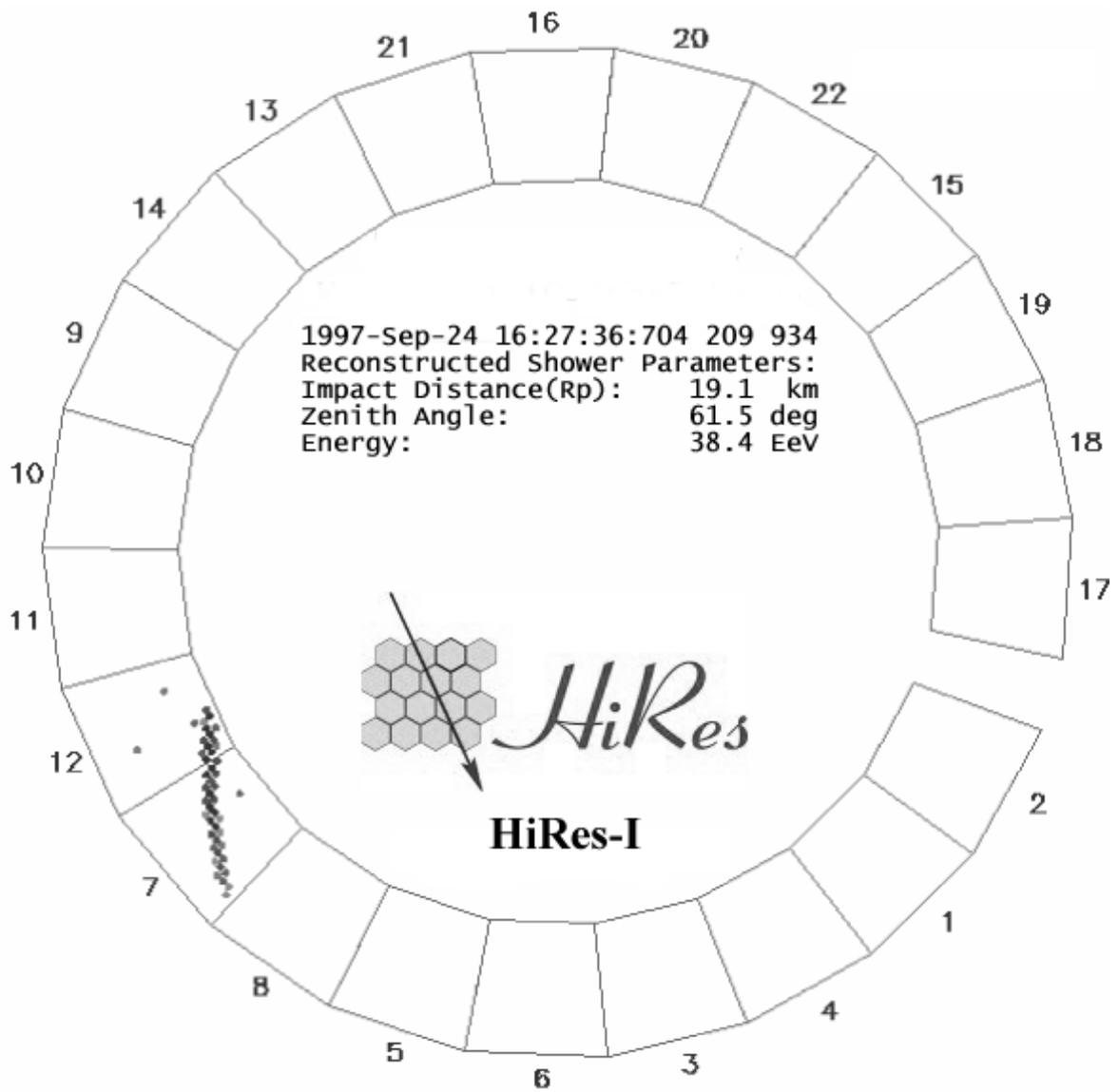


Figure 1: A copy of the HiRes event display for a cosmic ray event. First pass reconstruction parameters are indicated in the center.