T 73: Gammaastronomie 4

Zeit: Mittwoch 16:45–19:05 Raum: P2

Gruppenbericht T 73.1 Mi 16:45 P2
FACT - Status and Results from 2.5 Years of Operation — •Daniela Dorner for the FACT-Collaboration — Universität Würzburg, Deutschland

As from October 2011, the First G-APD Cherenkov Telescope (FACT) has been operational showing that silicon photo multipliers are a very promising alternative to photo multiplier tubes in Cherenkov telescope cameras. Showing no ageing when exposed to strong light, Geiger-mode avalanche photo diodes (G-APDs) are ideal devices for long-term monitoring enlarging the duty cycle by 70% compared to purely darktime observations. A consistent data quality is achieved thanks to the very stable gain of G-APDs which can be ensured by a feedback system measuring the temperature and currents in the camera and correcting the applied bias voltage for it. As well as long-term monitoring, another goal of FACT is robotic operation. Remote and automatic operation are currently ongoing.

Results from 2.5 years of monitoring of bright TeV blazars will be presented.

T 73.2 Mi 17:05 P2
Performance der Hardware der G-APD Kamera von FACT — •Jens Buss und Fabian Temme für die FACT-Kollaboration — Technische Universität Dortmund, Experimentelle Physik 5b, Dortmund, Germany

Das Teleskop FACT (First G-APD Cherenkov Telescope) ist das erste abbildende Luft-Cherenkov Teleskop mit einer Kamera, die Halbleiter-Detektoren, genauer gesagt G-APDs (Geiger-mode Avalanche Photodioden), anstatt von konventionellen Sekundärelektronenvervielfachern nutzt. Die G-APDs zeichnen sich durch ihre Robustheit und eine deutlich niedrigere Betriebsspannung aus. Dennoch zeigen sie eine vergleichbare Verstärkung und Detektionseffizienz. Diese Eigenschaften gestatten FACT vergleichsweise größere Beobachtungszeiten durch Observationen bei extremen Lichtbedingungen wie z.B. bei starkem Mondlicht. Ein präzise Regelung der Detektor-Elektronik entsprechend der vorherrschenden Umgebungsbedingungen wird mit Hilfe eines Feedback-Systems gewährleistet. Dieses passt die Betriebsspannungen der Photodetektoren auf Grundlage der Temperaturen und Ströme an und gewährleistet so eine stabile und homogene Verstärkung der Signale der einzelnen Pixel. In diesem Vortrag wird ein Überblick über die Hardware der FACT Kamera, sowie deren Kalibrierung und Performance gegeben.

T 73.3 Mi 17:20 P2
Towards large size SiPM camera for current and future generations of Cherenkov telescopes — Priyadarshini Bangale[1], Daniel Mazin[1], •Uta Menzel[1], Julian Sitarek[2], Jose Maria Illa[2], Juan Cortina[2], Manel Martinez[2], Razmik Mirzoyan[1], Juergen Hose[1], Masahiro Teshima[1], and Takeshi Toyama[1] — [1]MPI for Physics, Munich, Germany — [2]IFAE, Barcelona, Spain

So far the current ground-based Imaging Atmospheric Cherenkov Telescopes (IACTs) have energy thresholds in the best case in the range of ~30 to 50 GeV (H.E.S.S.-II and MAGIC-II). Lowest energy gamma-ray showers produce low light intensity images and cannot be efficiently separated from dominating images from hadronic background. A cost effective way of improving the telescope performance at lower energies is to use novel photo sensors with superior photon detection efficiency (PDE). Currently the best superbialkali photomultipliers (PMTs) have a PDE up to 42%, whereas the silicon photomultipliers (SiPMs, also known as MPPC, GAPD) from some manufacturers show a photon detection efficiency of about 40-45%. SiPMs can be operated at high background illumination, which would allow to operate the IACT also during partial moonlight, dusk and dawn, hence increasing the instrument duty cycle. We are testing the SiPMs for Cherenkov telescopes such as MAGIC and CTA. Here we present an overview of our setup and first measurements, which we perform in two independent laboratories, in Munich, Germany and in Barcelona, Spain.

T 73.4 Mi 17:35 P2
FACT - long-term monitoring and flare alerts — •Katja Meier for the FACT-Collaboration — Universität Würzburg

One of the major goals of the First G-APD Cherenkov Telescope (FACT) is the long-term monitoring of bright TeV blazars. With these data, flare studies are carried out in order to better understand the underlying physics of these extremely variable objects. In case of enhanced activity in one of the monitored objects, an alert to more sensitive instruments is sent. To send such triggers in almost real time, a quick look analysis on site has been set up providing excess rate curves. As the excess rate depends on the zenith distance and the level of night sky background light of the observation, these effects have been studied with data taken on the Crab Nebula.

Results from this study and the quick look analysis will be presented.

T 73.5 Mi 17:50 P2
Signal - Hintergrund Trennung für FACT Daten — •Julia Thaele für die FACT-Kollaboration — TU Dortmund, Dortmund, Deutschland

Um die Daten des First G-APD Cherenkov Telescope (FACT) analysieren zu können, müssen die viel zahlreicheren Hintergrundschauer, wie z.B. hadronische Schauer oder Myonenringe, von den Gamma-Schauern getrennt werden. Zu diesem Zweck können innerhalb der Data-Mining Umgebung RapidMiner verschiedene Klassifikationsmethoden angewandt werden. In diesem Vortrag wird eine Studie zur Separation im Rahmen dieser Umgebung präsentiert und mit Referenz-Verfahren verglichen.

T 73.6 Mi 18:05 P2
Monte Carlo studies of cosmic ray background in Imaging Air Cherenkov Telescopes — •Uta Menzel[1], Razmik Mirzoyan[1], and Emiliano Carmona[2] — [1]Max-Planck-Institut für Physik, München, Deutschland — [2]CIEMAT, Madrid, Spain

Imaging air Cherenkov telescopes (IACTs) like MAGIC detect high energy gamma rays by observing Cherenkov light emission from extensive air showers produced in the atmosphere. The main source of background in this technique is due to numerous hadronic cosmic rays, which also produce air showers. To be able to reduce this background, it is important to study the properties of hadronic showers, which mimick images of gamma-rays in the IACT camera. We use CORSIKA, the standard Monte Carlo simulation program used by the MAGIC collaboration, with additional output providing more information about the Cherenkov photon emitters and parent particles in hadronic showers. This allows us to visualize Cherenkov light distributions from single particles (electron, muon, etc.) and from sub-showers. We use this information for studying the potential of reducing the misclassified cosmic-ray induced background.

T 73.7 Mi 18:20 P2
Eine Datenanalyse-Kette für FACT — •Fabian Temme und Julia Thaele für die FACT-Kollaboration — Tu Dortmund, Deutschland

Das First G-APD Cherenkov Telescope (FACT) nimmt seit dem Oktober 2011 Daten. Um echte Daten zu analysieren, wurde eine Monte Carlo Simulation für den Reflektor und die Kamera entwickelt. Parameter Verteilungen der simulierten Ereignisse wurden mit Verteilungen von echten Daten Ereignissen verglichen und die Einstellungen des Monte Carlo verfeinert um eine realistische Simulation des Teleskopes zu erhalten. Auf Basis der Informationen der Simulation, wurde eine Separation der Gamma Schauer von den weit häufiger auftretenden Hintergrund Schauern, wie hadronischen Schauer oder Myonenringen, durchgeführt. Auf den resultierenden Daten Satz von Gamma Kandidaten wurde eine Quell Analyse angewandt. In diesem Vortrag werden Ergebnisse der fortlaufenden Arbeit an dieser Datenanalyse-Kette gezeigt.

T 73.8 Mi 18:35 P2
The automatic Monte Carlo production chain for MAGIC at the TU Dortmund — •Katharina Frantzen for the MAGIC-Collaboration — TU Dortmund, Dortmund, Deutschland

This talk will give a short introduction into the Monte Carlo production chain for the two Major Atmospheric Gamma-Ray Imaging Cherenkov (MAGIC) Telescopes. The simulation programs are presented and their tasks in the simulation chain are described. Furthermore the used programs of the MAGIC Analysis and Reconstruction Software (MARS) are presented and their functions are outlined. Finally, the automatic production structure and the used computing structure at the TU Dortmund is presented and the performance of the cluster, using 3684 cores, in the Monte Carlo production is described.

T 73.9 Mi 18:50 P2

New method for correcting Cherenkov telescope energy spectra for variable atmospheric transmission by using LIDAR measurements — •Christian Fruck[1], Markus Gaug[2], Jürgen Hose[1], Miquel Cassanyes[2], Lluís Font[2], Razmik Mirzoyan[1], and Masahiro Teshima[1] for the MAGIC-Collaboration — [1]Max-Planck-Institut für Physik, München, Germany — [2]Universitat Autònoma de Barcelona, Barcelona, Spain

Over the past 20 years, Imaging Air-shower Cherenkov Telescopes (IACTs) have opened a new observational window to the most energetic processes in the Universe. But at the TeV energy scale, long integration times are necessary in order to accumulate enough events for significant detections and accurate energy spectral determinations. With the atmosphere being part of the detector, adverse atmospheric conditions like clouds or aerosols can reduce the usable amount of data by a significant fraction. In this talk, a simple method will be presented to extract cloud/aerosol transmission profiles from single wavelength micro-Joule LIDAR data, and to do event by event corrections to IACT data. In the conference I will show, using data from the MAGIC telescopes, that such information can be used to recover energy spectra of TeV sources recorded during adverse observational conditions and how future application of this technique could increase the effective observation time of IACTs.