T 80: Gammaastronomie IV

Zeit: Mittwoch 16:45–19:05 Raum: VMP9 SR 27

Gruppenbericht T 80.1 Mi 16:45 VMP9 SR 27

M@TE - Monitoring at TeV Energies — •Daniela Dorner[1], Thomas Bretz[2], Magdalena González[3], Ruben Alfaro[3], and Gagik Tovmassian[4] — [1]Universität Würzburg, Deutschland — [2]RWTH Aachen, Deutschland — [3]Universidad Nacional Autónoma de México, Mexiko — [4]Instituto de Astronomia Sede Ensenada, Mexiko

A dedicated long-term monitoring programm at TeV energies has been started by the FACT project about four years ago. Being limited to one site, gaps due to the rotation of the Earth remain in the measured light curves. This makes it difficult to study typical variability time scales of few hours to one day. To allow for systematic studies of continuous observations over up to 12 hours, a second telescope is being installed at a site in about six hours distance in longitude. For the M@TE (Monitoring at TeV energies) telescope, a mount from a previous experiment is being refurbished and will be equipped with a new camera. Using silicon based photo sensors like in FACT, an excellent and stable performance will be achieved. M@TE is a joint project of German and Mexican universities which aims at extending the blazar monitoring to so far unexplored time ranges. In the presentation, the status of this emerging project will be reported.

T 80.2 Mi 17:05 VMP9 SR 27

Sternenspuren mit dem Fluoreszenzteleskop FAMOUS — •Tim Niggemann[1], Jan Auffenberg[2], Thomas Bretz[1], Bengt Hansmann[2], Tim Hansmann[2], Thomas Hebbeker[1], Julian Kemp[1], Lukas Middendorf[1], Leif Rädel[2], Merlin Schaufel[2], Christine Peters[1], Johannes Schumacher[1], Martin Stahlberg[2], Ansgar Werhan[2] und Christopher Wiebusch[2] — [1]III. Physikalisches Institut A, RWTH Aachen University — [2]III. Physikalisches Institut B, RWTH Aachen University

Ein etabliertes Verfahren zur Detektion hochenergetischer kosmischer Strahlung ist die Messung ausgedehnter Luftschauer. Diese Teilchenkaskaden regen Stickstoffatome in der Erdatmosphäre zur isotropen Abstrahlung von Fluoreszenzlicht im UV-Bereich an. Durch die Detektion des Fluoreszenzlichts wird eine kalorimetrische Messung der Energie des Primärteilchens ermöglicht. Aus dem Lichtprofil lassen sich Rückschlüsse auf die Masse des Teilchens gewinnen. Am Pierre-Auger-Observatorium in Argentinien werden zu diesem Zweck Teleskope eingesetzt, deren lichtsensitive Detektorkomponente Photomultiplierröhren sind.

Wir haben den Teleskop-Prototypen FAMOUS ("First Auger Multipixel photon counter camera for the Observation of Ultra-high-energy air Showers") mit 64 Pixeln in Betrieb genommen, welcher durch den Einsatz von Silizium-Photomultipliern zukünftig eine gesteigerte Sensitivität bei der Messung ausgedehnter Luftschauer verspricht. In diesem Vortrag werden wir die neu entwickelte Spannungsversorgung und Messungen von Sternenspuren am Nachthimmel vorstellen.

T 80.3 Mi 17:20 VMP9 SR 27

Messung und Überwachung der atmospärischen Parameter bei den MAGIC-Teleskopen — •Martin Will für die MAGIC-Kollaboration — Instituto de Astrofísica Canarias, La Laguna, Tenerife, Spain

Die MAGIC-Teleskope auf La Palma auf den Kanarischen Inseln messen ausgedehnte Luftschauer, die von hochenergetischen Gamma-Strahlen in der Atmosphäre produziert werden. Die Kenntnis des genauen Zustands der Atmosphäre ist dabei von großer Wichtigkeit, sowohl für den korrekten und sicheren Betrieb der Teleskope, als auch für die spätere Datenanalyse.

Eine Wetterstation misst Zustandsgrößen wie Temperature und Luftfeuchte, die atmosphärische Transmission wird mittles eines LIDAR-Systems und eines Infrarot-Pyrometers bestimmt. Mit Hilfe einer AllSky-Kamera kann die Bewölkung abgeschätzt werden. Die Messwerte werden vervollständigt durch Daten des GFS-Modells aus globalen Messungen und numerischer Wettervorhersage.

Im Vortrag wird eine Übersicht der genannten Instrumente und deren Messungen präsentiert, sowie langjährige Studien der archivierten Wetterdaten am Standort der MAGIC-Teleskope und deren Vergleich zu Modell-Daten.

T 80.4 Mi 17:35 VMP9 SR 27

FACT – Normalized and Asynchronous Mirror Alignment for Cherenkov Telescopes — •Sebastian Achim Mueller[1] and Jens Buss[2] — [1]ETH Zurich, Switzerland — [2]TU Dortmund

Imaging Atmospheric Cherenkov Telescopes (IACTs) need fast and large imaging optics to map the faint Cherenkov light emitted in cosmic ray air showers onto their image sensors. Segmented reflectors are inexpensive, lightweight and offer good image quality. However, alignment of the mirror facets remains a challenge. A good alignment is crucial in IACT observations to separate gamma rays from hadronic cosmic rays. We present a star tracking alignment method which is not restricted to clear nights. It normalizes the mirror facet reflections to be independent of the reference star or the cloud coverage. It records asynchronously of the telescope drive which makes the method easy to integrate in existing telescopes. It can be combined with remote facet actuation, but it does not need one to work. Furthermore, it can reconstruct all individual mirror facet point spread functions. We present the method and alignment results on the First Geiger-mode Photo Diode Avalanche Cherenkov Telescope (FACT) on the Canary Island of La Palma, Spain.

T 80.5 Mi 17:50 VMP9 SR 27

FACT – Bokeh Alignment for Cherenkov Telescopes — •Sebastian Achim Mueller[1] and Jens Buss[2] — [1]ETH Zurich, Switzerland — [2]TU Dortmund

Imaging Atmospheric Cherenkov Telescopes (IACTs) need fast and large imaging optics to map the faint Cherenkov light emitted in cosmic ray air showers onto their image sensors. Segmented reflectors are inexpensive, lightweight and offer good image quality. However, alignment of the mirror facets remains a challenge. A good alignment is crucial in IACT observations to separate gamma rays from hadronic cosmic rays. We present a simple, yet extendable method, to align segmented reflectors using their Bokeh. Bokeh alignment does not need a star or good weather nights but can be done anytime, even during the day. Bokeh alignment optimizes the facet orientations by comparing the segmented reflector's Bokeh to a predefined template. The Bokeh is observed using the out of focus image of a nearby point like light source in a distance of about ten times the focal lengths. We introduce Bokeh alignment on segmented reflectors and present its use on the First Geiger-mode Avalanche Cherenkov Telescope (FACT) on Canary Island La Palma, as well as on the Cherenkov Telescope Array (CTA) Medium Size Telescope (MST) prototype in Berlin Adlershof.

T 80.6 Mi 18:05 VMP9 SR 27

First Data from IceAct, an Imaging Air Cherenkov Telescope with SiPMs at the South Pole — •Jan Auffenberg, Thomas Bretz, Bengt Hansmann, Tim Hansmann, Thomas Hebbeker, Julian Kemp, Lukas Middendorf, Tim Niggemann, Leif Rädel, Merlin Schaufel, Johannes Schumacher, Martin Stahlberg, Ansgar Werhan, and Christopher Wiebusch — RWTH Aachen University

IceCube-Gen2 is planned to extend the IceCube Neutrino Observatory at the geographic South Pole. For neutrino astronomy, a large background-free sample of well-reconstructed astrophysical neutrinos is essential. The main background for this signal are muons and neutrinos which are produced in cosmic-ray air showers in the Earth's atmosphere. The coincident detection of these air showers by the surface detector IceTop has been proven to be a powerful veto for atmospheric neutrinos and muons in the field of view of the Southern Hemisphere. This motivates a large extension of IceTop to more efficiently detect cosmic rays, IceVeto. Part of these extension plans is an array of imaging air Cherenkov telescopes, IceAct. A first IceAct prototype is consisting of an SiPM camera and lens optics optimized for harsh environments. Compared to IceTop stations, these telescopes potentially lower the detection threshold for air showers at the cost of a lower duty cycle. We will present first data, taken during the commissioning of an IceAct prototype in December 2015 at the South Pole.

T 80.7 Mi 18:20 VMP9 SR 27

Template Analysis for the MAGIC telescopes — •Uta Menzel for the MAGIC-Collaboration — Max-Planck-Institut für Physik, München

The MAGIC telescopes are two 17-m-diameter Imaging Air Cherenkov

Telescopes located on the Canary island of La Palma. They record the Cherenkov light from air showers induced by very high energy photons. The current data analysis uses a parametrization of the two shower images (including Hillas parameters) to determine the characteristics of the primary particle. I am implementing an advanced analysis method that compares shower images on a pixel basis with template images based on Monte Carlo simulations. To reduce the simulation effort the templates contain only pure shower images that are convolved with the telescope response later in the analysis. The primary particle parameters are reconstructed by maximizing the likelihood of the template. By using all the information available in the shower images, the performance of MAGIC is expected to improve. In this presentation I will explain the general idea of a template-based analysis and show the first results of the implementation.

T 80.8 Mi 18:35 VMP9 SR 27

Spectral, morphological and temporal analysis of the Galactic Center gamma-ray emission based on new observations with MAGIC — Christian Fruck[1], •John E Ward[2], and Ievgen Vovk[1] for the MAGIC-Collaboration — [1]Max-Planck-Institut für Physik, München, GERMANY — [2]Institut de Fisica d'Altes Energies, Barcelona, SPAIN

During the past four years, MAGIC has observed the Galactic Center (GC) region at large zenith distance (58°-70°) for more than 60 h after quality cuts. Based on this data set we have studied the gamma-ray spectrum of the central source up to 40 TeV, and searched for time variability in its flux during the pericentre passage of the G2 object, which approached the central black as close as about 2000 Schwarzschild radii in 2013/14. These observations also gave us the opportunity to study the morphology of the extended TeV emission in the GC region.

T 80.9 Mi 18:50 VMP9 SR 27

A spatial likelihood analysis for MAGIC skymaps — •Marcel Strzys, Ievgen Vovk, and Christian Fruck for the MAGIC-Collaboration — Max-Planck-Institut für Physik, München, Deutschland

Due to the constant improvement of the sensitivity of Cherenkov telescopes the detection of ever weaker signals becomes possible resulting in much more details in the morphologies of the observed sources. The task of flux extraction from different subregions of the observed source is challenging with the traditional approach employing the "aperture photometry" technique. We therefore developed a new analysis tool for MAGIC that allows the user to simultaneously fit several sources, similar to what is common practice in space gamma-ray observatories such as EGRET and *Fermi*-LAT. The method incorporates an user-defined composite source model, the background from hadronic events, and a full Monte-Carlo based modelling of the instrument response functions. A model of the source as seen by the telescopes is constructed and fitted to the data. In this way arbitrarily complex morphological models can be tested for their significance and the spectrum of several subcomponents can be extracted self-consistently. We are going to present the method and its applicability to gamma-ray observations using data from the MAGIC telescopes.