

T 18: Gammaastronomie I

Zeit: Montag 11:00–12:35

Raum: VMP9 SR 27

Gruppenbericht T 18.1 Mo 11:00 VMP9 SR 27
Status and recent results of the MAGIC telescope system
 — ●CHRISTIAN FRUCK for the MAGIC-Collaboration — Max-Planck-Institut für Physik, München, GERMANY

MAGIC is an instrument for pointed ground-based observations of the gamma-ray sky in the 50 GeV to 80 TeV regime. The two 17 m diameter Imaging Air Cherenkov Telescopes are located on 2200 m a.s.l. at the Roque de los Muchachos Observatory on the Canary island La Palma. We will report the status and recent technical developments of the instrument, highlight the most important scientific results obtained with observations of Galactic and extragalactic objects, and will summarize future plans.

T 18.2 Mo 11:20 VMP9 SR 27
Cross Calibration of the H.E.S.S. Telescopes — ●DAVID JANKOWSKY and IRA JUNG-RICHARDT — ECAP, Universität Erlangen-Nürnberg

The H.E.S.S. experiment consists of five imaging atmospheric Cherenkov telescopes. Four smaller, identical ones have a mirror area of 108 m² and a larger one that has a mirror area of 614 m². To guarantee high quality data and the best possible physical output it is essential that all data are well understood. This talk presents a possible method to check the responses of such mixed telescope systems: the inter and cross calibration. The main idea behind this calibration is to compare the reconstructed image amplitudes (number of measured photo electrons) or energies of the individual telescopes pairwise and to search for differences in the responses. To illustrate the usability of the methods and their implications on data taking without systematic effects from the telescope array, this talk shows results which were obtained with the help of Monte Carlo simulations.

T 18.3 Mo 11:35 VMP9 SR 27
Increasing Data Quality by Predicting Cloud-Movement with Allsky-Cams — ●JAN ADAM, JENS BUSS, and MAXIMILIAN NÖTHER for the FACT-Collaboration — TU Dortmund, Germany

Clouds and related atmospheric phenomena have a big influence on the quality of astronomical observations. Especially in case of ground-based gamma telescopes such as FACT, bad atmospheric conditions impair the reconstruction of air-shower events.

The First G-APD Cherenkov Telescope aims for automatic long-term monitoring. Therefore, it benefits greatly from an advanced scheduling algorithm which takes into account the current weather conditions. While there is no way to reduce the occurrence of clouds in the direction of a desired object, it is possible to increase the duty cycle by switching to an uncovered source. Hence, a quantitative rating of the sky cloudiness is needed to differentiate between covered and uncovered areas.

This talk presents a method to calculate the current sky cloudiness by searching stars in 180° allsky camera images. This method can be applied to arbitrary areas, e.g., the whole sky or a few degrees around any certain source. Results and various visualisations will be presented, such as the distribution of the parameters for different weather conditions. Moreover, their development over time will be shown for multiple sources in a partly clouded night. And a first approach for predicting the cloud's movement by using subsequent images and additional data such as wind profiles will be discussed.

T 18.4 Mo 11:50 VMP9 SR 27
Pulsar Observations with the MAGIC telescopes — ●JEZABEL R. GARCIA¹, S. BONNEFOY², D. CARRETO-FIDALGO², F. DAZZI¹, D. GALINDO³, W. IDEC¹, M. LOPEZ², E. MORETTI¹, E. DE ONA WILHELM⁴, I. REICHARDT⁵, T. SAITO⁶, T. SCHWEIZER¹, and R. ZANIN³ for the MAGIC-Collaboration — ¹Max-Planck-Institut für Physik, Munich, Germany — ²Universidad Complutense, Madrid,

Spain — ³Universitat de Barcelona, ICC/IEEC-UB, Barcelona, Spain — ⁴Institute for Space Sciences (CSIC/IEEC), Barcelona, Spain — ⁵Istituto Nazionale di Fisica Nucleare (INFN), Padova, Italy — ⁶Kyoto University, Hakubi center, Japan

MAGIC is a stereoscopic system of two IACTs, located at the ORM (Spain). Since 2008, MAGIC has played a big role in Pulsar physics due to the discovery of the first VHE gamma-ray emission from the Crab pulsar. Such a discovery was possible thanks to a revolutionary trigger technique used in the initial MAGIC mono system, the Sum-Trigger, that provided a 25 GeV energy threshold. The study of the Crab keeps providing numerous important results for the understanding of pulsar physics. The most recent ones are the bridge emission at VHE and the detection of the Crab pulsations at TeV energies. MAGIC has been also searching for new pulsars, providing recently interesting results about the Geminga pulsar and nebula. This talk reviews the essential MAGIC results about VHE pulsars and their implications for pulsar physics. Also we discuss the development of a new stereo trigger system, the Sum-Trigger-II, and the importance of the observation windows that this system opens for the study of VHE pulsars.

T 18.5 Mo 12:05 VMP9 SR 27
FACT - Influence of Night Sky Background Photons and Crosstalk — ●JENS BUSS¹, SEBASTIAN MÜLLER², and FABIAN TEMME¹ for the FACT-Collaboration — ¹Experimentelle Physik 5b, TU Dortmund, Deutschland — ²IPP, ETH Zürich, Schweiz

During the last four years, the First G-APD Cherenkov Telescope (FACT) established silicon-based photo detectors as a valid concept for the imaging atmospheric Cherenkov technique. These detectors, namely silicon photo multipliers (SiPMs), are more robust to bright light conditions than conventional photo multiplier tubes (PMTs). At the same time, SiPMs feature a high photon detection efficiency. As a consequence, this technology yields observations at bright light conditions where PMTs would be damaged.

However, dark counts and night sky background light (NSB), in combination with optical crosstalk and after-pulses contribute to the extracted signal from Cherenkov photons. Therefore, they cause a bias on the photon charge extraction and any subsequent analysis steps. Consequently, it is necessary to understand their impact on the data of FACT.

This presentation will show the influence of changing NSB and crosstalk conditions on the performance of FACT. Therefore, the influence on the analysis chain is investigated on basis of data that were taken at different NSB conditions as well as dedicated Monte Carlo simulations.

T 18.6 Mo 12:20 VMP9 SR 27
FACT – Multivariate Extraction of Muon Ring Images — ●MAXIMILIAN NÖTHER, FABIAN TEMME, and JENS BUSS for the FACT-Collaboration — Experimentelle Physik 5b, TU Dortmund, Dortmund
 In ground-based gamma-ray astronomy, muon ring images are an important event class for instrument calibration and monitoring of its properties. In this talk, a multivariate approach will be presented, that is well suited for real time extraction of muons from data streams of Imaging Atmospheric Cherenkov Telescopes (IACT).

FACT, the First G-APD Cherenkov Telescope is located on the Canary Island of La Palma and is the first IACT to use Silicon Photomultipliers for detecting the Cherenkov photons of extensive air showers. In case of FACT, the extracted muon events are used to calculate the time resolution of the camera. In addition, the effect of the mirror alignment in May 2014 on properties of detected muons is investigated.

Muon candidates are identified with a random forest classification algorithm. The performance of the classifier is evaluated for different sets of image parameters in order to compare the gain in performance with the computational costs of their calculation.