T 59: Gammaastronomie 3

Zeit: Dienstag 16:45–19:10 Raum: H 2

Gruppenbericht T 59.1 Di 16:45 H 2

FACT - Results from Five Years of TeV Monitoring — Daniela Dorner[1] and •Jens Buss[2] for the FACT-Collaboration — [1]Universität Würzburg, Germany — [2]TU Dortmund, Germany

The First G-APD Cherenkov Telescope (FACT) is monitoring blazars to study their variability and its origin. Pioneering the usage of SiPMs, the data taking efficiency was maximized reaching more than 2350 h of physics data in 12 months. Deriving a spectrum of the TeV standard candle Crab Nebula, the excellent performance of FACT was illustrated. To foster simultaneous multi-wavelength (MWL) observations, crucial to understand blazar physics, the FACT quick look analysis provides results with low latency. Based on this, 40 alerts and six astronomer's telegrams (Atels) were sent since March 2014. An early alert in 2012, resulted in detailed observations by the neighboring MAGIC telescopes on Mrk 501 providing useful information for the associated MWL study. In 2014, the follow-up by H.E.S.S. to another alert on the same source provides a high resolution spectrum complementing FACT's dense long-term light curve. A moderate flux flare of Mrk 421 in Dec 2015 triggered the ongoing target-of-opportunity program with X-ray satellites resulting in time-resolved spectral energy distributions. In 2016, 1ES 1959+650 underwent the brightest flaring activity in TeV energies since 2002. From FACT, an unprecedented dense light curve is available resulting in 26 alerts, five Atels and valuable MWL data. Studies about the long-term behaviour of several sources based on the FACT light curves are ongoing. The presentation summarizes experience and results from more than five years with FACT.

Gruppenbericht T 59.2 Di 17:05 H 2

M@TE - Monitoring at TeV Energies — Daniela Dorner[1], •Thomas Bretz[2], Ruben Alfaro[3], Magdalena González[3], Gagik Tovmassian[3], Simone Dichiara[3], and Karl Mannheim[1] — [1]Universität Würzburg, Germany — [2]RWTH Aachen, Germany — [3]Universidad Autónoma de México, Mexico

Blazars are extremely variable objects emitting radiation across the electromagnetic spectrum and showing variability on time scales from minutes to years. To study typical variability time scales from hours to minutes, continuous observations are crucial.

A dedicated long-term monitoring program for bright TeV blazars has been started by the FACT project about five years ago. Being limited to one site, gaps due to the rotation of the Earth remain in the measured light curves. To allow for systematic studies using continuous observations over up to 12 hours, a second telescope is being installed at the observatory in San Pedro Martir in Mexico.

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 the project will be discussed.

T 59.3 Di 17:25 H 2

Study on the classification of blazars with machine learning techniques using multiwavelength information — •Konstantin Pfrang — Technische Universität Dortmund

The Third Fermi-LAT source Catalog (3FGL) is the deepest all sky survey in gamma-rays so far. Though there are significant achievements in classifying the objects to source types, 1010 sources could not be linked to any of them, and 573 are associated to Active Galactic Galaxies (AGNs) but without any further classification.

By now machine learning techniques have become an important tool for exploring astrophysical data. In previous works the classification with those techniques was only based on information from gamma-ray observation. The removal of the restriction on only one single energy regime provides further information about the energy spectrum. Therefor it is crucial to find counterparts to 3FGL sources in catalogs of other wavelengths.

In this talk, a method to identify possible counterparts for 3FGL sources is introduced and applied to the radio catalog NVSS. Furthermore, the performance of the machine learning algorithms is studied using the framework RapidMiner.

T 59.4 Di 17:40 H 2

MAGIC observations of the enigmatic Gamma Cygni supernova remnant — •Marcel C. Strzys[1], Shu Masuda[2], Takayuki Saito[2], and Ievgen Vovk[1] for the MAGIC-Collaboration — [1]Max-Planck-Institut für Physik, München — [2]Kyoto University, Kyoto, Japan

Gamma Cygni (G78.2+2.1) is one of the first supernova remnants (SNR) detected in the high-energy gamma-ray band. It is a middle-aged SNR (≈ 7000 years old) situated in the Cygnus region. The high-energy observations by VERITAS and Fermi-LAT revealed a complex, energy-dependent morphology of the SNR in the GeV-TeV band, different from that observed in X-rays. G78.2+2.1 also hosts the pulsar PSR J2021+4026, which is the only variable gamma-ray pulsar known to date. Here we present the results from recent MAGIC observations of the Gamma Cygni nebula and pulsar complex. We discuss the TeV morphology of the source and possible origins of the gamma-ray emission in the multi-wavelength context.

T 59.5 Di 17:55 H 2

Monitoring FSRQs with MAGIC: the case of PKS1510-089 — •Cosimo Nigro for the MAGIC-Collaboration — DESY Zeuthen, Germany

Among the VHE extragalactic γ-ray emitters, blazars are the most favorably detected by the stereoscopic Imaging Air Cherenkov Telescopes system of MAGIC. Sensitive to gamma-ray energies down to 50 GeV, MAGIC strongly contribute to increase their census, particularly with the type of Flat Spectrum Radio Quasars. Standing out as highly redshifted emitters of the blazar class, they are characterized by softer VHE γ-ray spectra and are favorably detected during short flares, making their multiwavelenght monitoring crucial. PKS1510-089, detected by MAGIC also over extended periods, provides an interesting case of study for the low state of these sources. An overview of the source MWL monitoring program will be given along with a resume of its quiescent state observation with MAGIC during the 2015-2016 period.

T 59.6 Di 18:10 H 2

Revisiting a Compton/Pair-Telescope using Liquid Xenon TPC Technology — •Jan Peter Lommler, Matteo Alfonsi, Christopher Hils, and Uwe Oberlack — Johannes Gutenberg-Universität Mainz

In the late 90's Aprile et al. were able to show the usability of liquid xenon time projection chambers for astronomical gamma ray imaging as a Compton telescope. Considering technological advancements and improved understanding of liquid xenon detector technology from Dark Matter searches, we are revisiting an extended concept for a Compton/Pair-Telescope in the energy range of ∼0.3 to ∼10 MeV in Compton mode and from ∼10 MeV to few GeV in pair-production mode, using an LXeTPC as position-sensitive calorimeter in combination with a tracker. At the current stage, we use Monte Carlo simulations to model instrument response and backgrounds to assess an expected performance envelope. The goal is to better understand design choices and to compare its performance against conventional current proposals, such as, e.g., eASTROGAM.

T 59.7 Di 18:25 H 2

Results from Observations of PSR B1259-63 with H.E.S.S. — •Thomas Murach — DESY Zeuthen, Deutschland

PSR B1259-63/LS 2883 is a binary system consisting of the massive O-type star LS 2883 and the neutron star PSR B1259-63. It is one of the seven gamma-ray binaries known to date. These systems comprise a massive star orbited by a compact object. Only for PSR B1259-63/LS 2883 the type of the compact object is known. The orbit of this neutron star is very eccentric, resulting in small spatial separations of the two stars of less than 1 AU around periastron. Close to periastron, the neutron star crosses the circumstellar disk around the host star twice. Due to the variable interactions in this system, variable emission of light is observed in all wavelength bands.
PSR B1259-63/LS 2883 was observed with the H.E.S.S. telescopes in Namibia around the times of four different periastron passages. Extended observations were conducted with the full H.E.S.S.-II array around the 2014 periastron, for the first time covering the time of pe-

riastron itself as well as parts of the orbit before the first disk crossing and during the GeV flare observed by Fermi-LAT. Results from these recent observations are presented. Due to the inclusion of data taken with the large telescope in the centre of the H.E.S.S. array, the energy threshold of $\lesssim 200$ GeV is unprecedentedly low for this source. A local flux minimum is observed at the time of periastron. High flux states are observed at the time of the GeV flare and, unexpectedly, before the first disk crossing. Predictions derived from a leptonic model are found to agree well with observations.

T 59.8 Di 18:40 H 2

FACT - Study of the TeV Blazar 1ES 1959+650 During a High Flux State in 2016 — •Amit Shukla and Daniela Dorner for the FACT-Collaboration — ITPA, University of Würzburg

The nearby TeV Blazar 1ES 1959+650 (z=0. 047) is a high-peaked BL Lacertae object and one of the main sources which has been monitored at very high gamma-ray energies (VHE) by the First G-APD Cherenkov Telescope (FACT) since October 2012. This source has been known to be in a low state of flux since its outburst in 2002 and did not show much of activity during the first three years of FACT monitoring. However, the source started showing enhanced activity in VHE gamma-rays during summer 2015 and reached a high flux state during summer of 2016. Several very bright flares were observed by FACT in June and July 2016, and four Atels were sent to alert the community. In this presentation, we will discuss the multiwaveband behavior of 1ES 1959+650 and evolution of the high state. A physics model that can explain several flaring episodes will be discussed.

T 59.9 Di 18:55 H 2

FACT - Long-Term Analysis of the Crab Nebula as Calibration Source — •Jonas Oberkirch for the FACT-Collaboration — TU Dortmund, Germany

The First G-APD Cherenkov Telescope (FACT) pioneers the use of silicon photo multipliers for Imaging Atmospheric Cherenkov telescopes (IACTs). To prove their usability, FACT's performance needs to be compared to other IACTs. For this comparison, the Crab Nebula is used as a "standard candle" due to its brightness and constant flux at TeV energies. FACT has been taking data since seeing first light in 2011.

IACTs see about 1000 hadronic air showers per photon-induced shower which are considered background. Since the amount of data taken during measurements is huge, machine learning methods are very well suited in the analysis for signal-background-separation and unfolding of the energy spectrum.

This analysis aims to extend the research done on one year of crab data to more of the data available and produce an energy spectrum as published before, taking into account changed hardware configurations, to estimate the performance of FACT.