

## T 27: Gammaastronomie II

Zeit: Montag 16:45–19:00

Raum: I.13.71 (HS 28)

T 27.1 Mo 16:45 I.13.71 (HS 28)

**Observation of the distant blazar PG1553+113 with Fermi and H.E.S.S.** — STEPHEN FEGAN, BERRIE GIEBELS, MATHIEU DE NAUROIS, JOHANNES KING, and DAVID SANCHEZ — Laboratoire Leprince-Ringuet, Palaiseau, France

High-frequency peaked BL Lac objects are primary targets and the bulk of extragalactic sources detected in the TeV range, and the AGN PG1553+113 belongs to this class. In the High Energy (HE) range, PG1553+113 exhibits a hard spectrum ( $\Gamma \sim 1.6$ ). The TeV spectrum, however, is among the softer ones ( $\Gamma \sim 4.5$ ) making this object the source with the sharpest break between the HE and TeV range ever detected.

An updated analysis of the Fermi data with a larger data set of 5 years, from 2008 August 4 to 2013 August 4 (MJD54682.0-56508.0) and improved reconstruction software is presented in this talk. The HE spectrum of PG1553+113 is fitted best by a log-parabola model. By correcting an estimated intrinsic power law spectrum for absorption due to the extragalactic background light (EBL), an estimation of the redshift of PG1553+113 can be made using also archival spectra in the Very High Energy (VHE) range. The found redshift can be considered as an upper limit and is in agreement with other measurements.

T 27.2 Mo 17:00 I.13.71 (HS 28)

**MAGIC Observation of an Exceptional TeV Gamma-ray Flare in the Active Galaxy IC 310** — DORIT GLAWION<sup>1</sup>, JULIAN SITAREK<sup>2</sup>, KARL MANNHEIM<sup>1</sup>, DOMINIK ELSÄSSER<sup>1</sup>, MATTHIAS KADLER<sup>1</sup>, ROBERT SCHULZ<sup>1</sup>, EDUARDO ROS<sup>3</sup>, UWE BACH<sup>3</sup>, FELICIA KRAUSS<sup>4</sup>, and JÖRN WILMS<sup>4</sup> for the MAGIC-Collaboration — <sup>1</sup>ITPA Würzburg — <sup>2</sup>IFAE Barcelona — <sup>3</sup>Max-Planck-Institut für Radioastronomie, Bonn — <sup>4</sup>ECAP Erlangen, Dr. Karl Remeis-Sternwarte, Bamberg

The AGN IC 310 has been identified as a gamma-ray emitter based on observations at very high energies (VHE,  $E > 100$  GeV) with the MAGIC telescopes. Despite IC 310 having been classified as a radio galaxy with the jet observed at an angle  $> 10$  degrees, it exhibits a mixture of multiwavelength properties of a radio galaxy and a blazar, possibly making it a transitional object. On the night of 12/13th of November 2012 the MAGIC telescopes observed a series of strong outbursts from the direction of IC 310 with flux-doubling time scales faster than 5 min and a peculiar spectrum spreading over two orders of magnitude. Such fast variability constrains the size of the emission region to be smaller than 20% of the gravitational radius of its central black hole. In fact, the measurement challenges the shock acceleration models, commonly used in explanation of gamma-ray radiation from active galaxies. We will show that this emission can be associated with pulsar-like particle acceleration by the electric field across a magnetospheric gap at the base of the jet.

T 27.3 Mo 17:15 I.13.71 (HS 28)

**FACT - Flare Alerts from Blazar Monitoring** — DANIELA DORNER<sup>1</sup> and THOMAS BRETZ<sup>2</sup> for the FACT-Collaboration — <sup>1</sup>Universität Würzburg, Deutschland — <sup>2</sup>RWTH Aachen, Deutschland

One of the major goals of the First G-APD Cherenkov Telescope is the longterm monitoring of bright TeV blazars. For more than three years, FACT has observed the blazars Mrk 421 and Mrk 501 and a few other sources on a regular basis. To understand these highly variable objects, simultaneous data at different wavelengths are very useful. FACT is not only taking part in multi-wavelength campaigns, but also sending alerts to other instruments in case of enhanced flux, to study flares within the multi-wavelength frame. To send fast alerts, an automatic quick look analysis was set up on site. Once the data are written on disk, they are automatically processed, and the analysis results are published on a website where other observers can monitor the activity of the source in the very high energy band. In addition, alerts are sent in case the flux is higher than a certain predefined value. In 2014, more than five alerts have been sent. Results from three years of monitoring will be presented.

T 27.4 Mo 17:30 I.13.71 (HS 28)

**Photonen- und Neutrinoflüsse aufgrund Dunkler Materie innerhalb galaktischer Halos** — MORITZ HÜTTEN — DESY Zeuthen

Numerische N-Körper Simulationen wie die Aquarius- und Via-Lactea Simulationen geben Auskunft über die Verteilung Dunkler Materie innerhalb galaktischer Halos. Damit ermöglichen diese Simulationen einen wesentlichen Beitrag zur Abschätzung der indirekten Messung Dunkler Materie über Teilchen wie Photonen und Neutrinos, welche bei der Paarvernichtung oder dem Zerfall Dunkler Materie entstehen. Bei der Abschätzung der Flüsse indirekter Nachweisteilchen innerhalb eines beliebigen aufgelösten galaktischen Halos, einschließlich seiner benachbarten Zwerggalaxien, bestehen allerdings große Unsicherheiten im Wissen über die Dichteverteilung der Dunklen Materie: Zum einen aufgrund der ungenügend bekannten Kinematik der Sterne insbesondere in Zwerggalaxien, zum anderen aufgrund der mangelnden Kenntnis der Varianz der Gestalt galaktischer Substrukturen aus einer statistisch ungenügenden Anzahl numerischer Simulationen. In diesem Vortrag wird die neue Version des semianalytischen Codes CLUMPY vorgestellt, mit welchem beide Einflüsse und ihre Unsicherheiten auf den sogenannten J-Faktor genau studiert werden können. Der Fokus dieses Beitrages wird dabei auf der Diskussion des Einflusses galaktischer Substrukturen liegen.

T 27.5 Mo 17:45 I.13.71 (HS 28)

**Recent findings about the galactic gamma-ray sky by MAGIC** — MARCEL C. STRZYS for the MAGIC-Collaboration — Max-Planck-Institut für Physik, München

The TeV sky currently consists of around 150 sources, about half of them situated within our galaxy. This group comprises various types of cosmic accelerators such as supernova remnants, pulsars, pulsar wind nebula, and binaries. From what we have observed in gamma rays so far, these sources can accelerate particles up to several hundred TeV. In this talk I will present recent results from the observation of galactic gamma-ray sources by MAGIC. This includes, among others, latest findings about the brightest, galactic gamma-ray source in the sky, the Crab nebula, results about one of the rare binary systems at TeV energies, insights into a not yet identified enigmatic source, and the discovery of the, so far, faintest PWN.

T 27.6 Mo 18:00 I.13.71 (HS 28)

**Simulation diffusiver Teilchenpropagation und damit verbundener Gammastrahlungsemission im Galaktischen Zentrum** — ALEXANDER ZIEGLER und CHRISTOPHER VAN ELDIK — ECAP, Universität Erlangen-Nürnberg

Im Galaktischen Zentrum wurde mit den H.E.S.S.-Teleskopen vor wenigen Jahren ein ausgedehntes Band sehr hochenergetischer diffuser Gammastrahlung entdeckt. In diesem Vortrag wird ein mögliches Szenario, das den Ursprung dieser Strahlung erklären könnte, vorgestellt und evaluiert. Es wird angenommen, dass die beobachtbare Strahlung durch Wechselwirkungsprozesse zwischen diffundierenden, hochenergetischen hadronischen Teilchen und dem dichten molekularen Material in der Region des Galaktischen Zentrums entsteht. Dabei gehen wir davon aus, dass diese hochenergetischen Teilchen zuvor in einer einzelnen Quelle im Galaktischen Zentrum, beispielsweise einer Supernova-Explosion vor  $10^4$  Jahren, lokal beschleunigt wurden.

Es werden Diffusionskoeffizienten vorgestellt, die aus einer statistischen Analyse der Bewegung von Vielteilchensystemen im Hinblick auf eine Umgebung wie das Galaktische Zentrum abgeleitet wurden. Die abgeleiteten Parameter wurden verwendet um das vorgestellte Szenario numerisch zu simulieren. Die Ergebnisse dieser Simulation werden präsentiert und diskutiert.

T 27.7 Mo 18:15 I.13.71 (HS 28)

**The Crab pulsar at Tera-electron-Volts energies** — DAVID CARRETO FIDALGO<sup>1</sup>, DANIEL GALINDO<sup>2</sup>, EMMA DE OÑA WILHELM<sup>3</sup>, ROBERTA ZANIN<sup>2</sup>, JEZABEL RODRIGUEZ GARCIA<sup>4,5</sup>, and FRANCESCO DAZZI<sup>4</sup> for the MAGIC-Collaboration — <sup>1</sup>Universidad Complutense, Madrid, Spain — <sup>2</sup>Universitat de Barcelona ICC IEEC-UB, Barcelona, Spain — <sup>3</sup>Institute of Space Sciences, Barcelona, Spain — <sup>4</sup>Max-Planck-Institut für Physik, München, Germany — <sup>5</sup>Inst. de Astrofísica de Canarias, La Laguna Tenerife, Spain

MAGIC is a system of two 17 m-diameter Imaging Atmospheric Cherenkov Telescopes (IACTs) located at the Roque de los Muchachos observatory (ORM, 28.8°N, 17.8°W, 2200 m a.s.l.) on the Canary island of La Palma. This system has observed the most energetic

ever detected pulsed gamma-ray from an astrophysical source, 2 Tera-electron-Volt emission from the Crab pulsar. Such measurements shed light on the particle acceleration mechanism of pulsars, pointing to Inverse Compton scattering of IR – X-ray photons at a distance bigger than 25 stellar radii from the neutron star. These are highly relevant results, since they challenge all the existing theoretical models as none of them can reproduce all the constraints that this observation has imposed.

T 27.8 Mo 18:30 I.13.71 (HS 28)

**Search for gamma-ray emitting AGN among unidentified Fermi-LAT sources using machine learning algorithms** — ●MARLENE DOERT<sup>1,2</sup>, SABRINA EINECKE<sup>1</sup>, and MANEL ERRANDO<sup>3</sup> — <sup>1</sup>Technische Universität Dortmund, Germany — <sup>2</sup>Ruhr-Universität Bochum, Germany — <sup>3</sup>Barnard College, Columbia University, New York City, USA

The second Fermi-LAT source catalog (2FGL) is the deepest all-sky survey of the gamma-ray sky currently available to the community. Out of the 1873 catalog sources, 576 remain unassociated. We present a search for active galactic nuclei (AGN) among these unassociated objects, which aims at a reduction of the number of unassociated gamma-ray sources and a more complete characterization of the population of gamma-ray emitting AGN. Our study uses two complementary machine learning algorithms which are individually trained on the gamma-ray properties of associated 2FGL sources and thereafter applied to the unassociated sample. The intersection of the two methods yields a high-confidence sample of 231 AGN candidate sources. We estimate the performance of the classification by taking inherent

differences between the samples of associated and unassociated 2FGL sources into account. A search for infra-red counterparts and first results from follow-up studies in the X-ray band using Swift satellite data for a subset of our AGN candidates are also presented.

T 27.9 Mo 18:45 I.13.71 (HS 28)

**Fermi Bubbles and bubble-like emission from the Galactic Plane** — WIM DE BOER and ●MARKUS WEBER — KIT, IEKP, Karlsruhe

The diffuse gamma-ray sky revealed 'Bubbles' of emission above and below the Galactic Plane symmetric around the centre of the Milky Way with a height of 10 kpc in both directions. From a novel template fit, which allows a simultaneous determination of the signal and foreground in any direction, we find that bubble-like emission is not only found in the halo, but in the Galactic plane as well with a width in latitude coinciding with the molecular clouds. The longitude distribution has a width corresponding to the Galactic bar with an additional contribution from the Scutum-Centaurus arm. The energy spectrum of the Bubbles coincides with the predicted contribution from CRs trapped in sources (SCRs). Also the energetics fits well. Hence, we conclude that the bubble-like emission has a hadronic origin, which arises from SCRs and the Bubbles in the halo arise from hadronic interactions in advected gas. Evidence for advection is provided by the ROSAT X-rays from hot gas in the Bubble region. We find that the morphology of the bubble-like emission in the plane coincides with the morphology of <sup>26</sup>Al, which is an outflow from SNRs. This strongly supports the interpretation of the Bubbles and bubble-like emission originating from SCRs.