HAP Workshop | Monitoring the non-thermal Universe

Report of Contributions

https://indico.kit.edu/e/HAP-Monitoring-Dec2016

Contribution ID: **3** Type: **Oral**

DSEA - A Data Mining Approach to Unfolding

Thursday, December 8, 2016 12:25 PM (20 minutes)

Obtaining energy spectra of incident particles such as neutrinos or gamma-rays is a common challenge in neutrino- and Air-Cherenkov astronomy, as the particle's energy cannot be observed directly but has to be inferred from other observables e.g. energy losses of secondary particles utilized for detection. The task is further made difficult by the fact that the production of secondaries, e.g. in a neutrino-nucleon interaction is governed by stochastical processes. Mathematically this corresponds to an inverse problem, which is described by the Fredholm integral equation of the first kind. Several algorithms for solving inverse problems exist, which are, however, somewhat limited, for example in the number of input variables or in the sense that only the unfolded distribution is returned and information on individual events is lost.
We present the Dortmund Spectrum Estimation Algorithm (DSEA), which aims at overcoming the afore mentioned obstacles by treating the inverse problem as a multinominal classification task. Within DSEA the final spectrum is obtained by summing the class-confidences of the individual events. DSEA, therefore, offers the advantage that any learning algorithm can be used as long as it returns the confidences of the individual classes. This results in a modular and highly flexible algorithm that can easily be tailored to a problem at hand. To avoid a potential bias on the class distribution used for the training of the learner, DSEA can be used iteratively using a uniform class-distribution as input.

Author: Dr RUHE, Tim (TU Dortmund)

Presenter: Dr RUHE, Tim (TU Dortmund)

Session Classification: Variability Methods

Track Classification: HAP Workshop

Contribution ID: **4** Type: **Poster**

Aperiodic x-ray variability in Blackhole binaries

To be able to fully describe the emission properties of a
black hole binary
system multi-wavelength observations are required as the inner parts
of the accretion disk and the corona emit X- and Gamma-
rays, outer parts of the accretion disk and the companion star emit
optical and infrared emission and jets emit radiation from
radio all the way to soft X-rays. In this matter i will model the
x-ray variability of this systems with a new developed model PROPFLUC
and compare it with previous models such as Lorentzian. Then i will
utilize evolution of the outer and inner disk radius for different
phases
and finally i will compare the evolution in standards and outliers in
the radio/X-ray correlation.

Author: Mr VAHDAT MOTLAGH, armin (Istanbul Technical University)

Co-author: Dr KALEMCI, Emrah (Sabanci university)

Presenter: Mr VAHDAT MOTLAGH, armin (Istanbul Technical University)

Track Classification: HAP Workshop

Contribution ID: **5** Type: **Poster**

Long-Term Spectral Evolution of an Anomalous X-ray Pulsar: XTE J1810-197

In this work, we study the long-term spectral evolution of the first transient anomalous X-ray pulsar XTE J1810−197 which was discovered in 2003, when its X-ray luminosity increased ≈100 fold. We fit the spectral data from all archival X-ray observations using a two-component blackbody model, where the cool component is most likely originating from the whole surface of the neutron star and the hot component is from a much smaller hot spot. We investigate the long-term evolution of the surface emission characteristics via tracing its surface temperature and apparent emitting area. We also explore the characteristics of an absorption line detected around 1.1 keV by fitting the data with an asymmetric Gaussian model.

Author: Ms VURGUN, Eda (Istanbul University)

Co-authors: Prof. GÖĞÜŞ, Ersin (Sabanci University); Ms CHAKRABORTY, Manoneeta (Sabanci University); Dr GÜVER, Tolga (Istanbul University)

Presenter: Ms VURGUN, Eda (Istanbul University)

Track Classification: HAP Workshop

Contribution ID: **6** Type: **Oral**

Polarization Variability in Leptonic and Hadronic Blazar Models

Thursday, December 8, 2016 3:35 PM (20 minutes)

We present results of time-dependent flux and polarization calculations in the framework of an internal-shock model for blazars. Both a leptonic and hadronic model are considered. It is shown that polarization-angle swings, accompanied by multi-wavelength flares, are a natural consequence of an internal shock in a jet pervaded by a helical magnetic field, without the need for bent or otherwise asymmetric jet features. However, if the high-energy emission is dominated by hadronic processes, such PA wings do not occur. Coupled MHD plus time- and polarization-dependent radiation-transfer simulations of such internal shocks will be shown for both leptonic and hadronic scenarios.

Author: Prof. BOETTCHER, Markus (North-West University)

Presenter: Prof. BOETTCHER, Markus (North-West University)

Session Classification: Modelling

Track Classification: HAP Workshop

Contribution ID: **9** Type: **Oral**

Monitoring the High-Energy Sky: the Fermi Experience

Wednesday, December 7, 2016 2:15 PM (30 minutes)

For more than eight years, scientists using the two instruments on the Fermi Gamma-ray Space Telescope have gained significant experience with monitoring the high-energy Universe. The Gamma-ray Burst Monitor (GBM) and Large Area Telescope (LAT) have huge fields of view, and Fermi operates in a scanning mode, allowing the entire gamma-ray sky to be viewed about every three hours. Most of the Fermi results have involved multi-wavelength or multi-messenger cooperation. The keys to successful near-simultaneous multi-wavelength observations are rapid data processing and fast sharing of information. The Fermi mission is continuing, and new analysis approaches are designed to increase the availability of data products useful for cooperative work. Fermi scientists look forward to continuing opportunities to work with multi-wavelength and multi-messenger observers.

Author: Dr THOMPSON, David (NASA Goddard Space Flight Center)

Presenter: Dr THOMPSON, David (NASA Goddard Space Flight Center)

Session Classification: Gamma-Ray Astronomy

Track Classification: HAP Workshop

Contribution ID: **10** Type: **Oral**

Detecting transient and periodic phenomena in astrophysical sources

Thursday, December 8, 2016 9:50 AM (20 minutes)

Time domain astronomy and astrophysics are concerned with studying the temporal characteristics of the light from distant astrophysical sources that our instruments detect. Consequently, time domain studies are aimed at the detection and characterisation of variability: periodic variability, aperiodic or stochastic variability, and transient events. In this presentation, I propose to introduce and discuss the fundamental elements of statistical data analysis involved in searching for transient phenomena and weak periods in noisy or sparse data. The concepts and techniques I will present apply equally to binned and unbinned time series data. However, given that the primary focus in this workshop is on high energies, special emphasis will be placed on the treatment of event data.

Author: Dr BELANGER, Guillaume (European Space Agency)

Presenter: Dr BELANGER, Guillaume (European Space Agency)

Session Classification: Variability Methods

Track Classification: HAP Workshop

Contribution ID: **11** Type: **Oral**

The H.E.S.S. Multi-Messenger Program

Saturday, December 10, 2016 11:50 AM (20 minutes)

In this contribution I will present the H.E.S.S. programs to follow up on multi-wavelength and multi-messenger observations and alerts.
I will show first results from searches for high-energy gamma-ray emission in spatial coincidence with neutrino events detected by the IceCube and ANTARES neutrino telescopes and discuss recent extensions towards a fully integrated real-time alert system between neutrino telescopes and the H.E.S.S. gamma-ray observatory. Ongoing activities searching for high-energy gamma-ray emission in coincidence with Gamma Ray Bursts, recent extensions to Fast Radio Bursts and Gravitational Waves are going to be discussed as well.

Author: Dr SCHÜSSLER, Fabian (IRFU / CEA-Saclay)

Presenter: Dr SCHÜSSLER, Fabian (IRFU / CEA-Saclay)

Session Classification: AMON Workshop

Track Classification: AMON Workshop

Contribution ID: **12** Type: **Oral**

Multi-messenger studies with the Pierre Auger Observatory

Wednesday, December 7, 2016 9:50 AM (20 minutes)

The Pierre Auger Observatory is the world's largest cosmic-ray detector, sensitive to cosmic rays with energy exceeding $\sim 10^{17}$ eV. In addition to charged cosmic rays that form the bulk of the cosmic-ray flux at ultra-high energies, Auger is sensitive to ultra-high energy neutral messengers (photons, neutrinos, and neutrons). The later are particularly exciting as they are expected to arrive in spatial, and temporal coincidence with electromagnetic counterparts from the yet unknown sources of ultra-high energy cosmic rays, and can be used for triggering, or follow-up in multi-messenger transient searches. I will review the activities of Auger as partner in multi-messenger searches, focusing on searches for ultra-high energy neutrinos from gravitational wave events, and the contribution of Auger to realtime multi-messenger searches within the Astrophysical Multi-messenger Observatory Network (AMON).

Author: Dr OIKONOMOU, Foteini (Penn State)

Presenter: Dr OIKONOMOU, Foteini (Penn State)

Session Classification: Multi-Messenger Astronomy

Track Classification: HAP Workshop

Contribution ID: **13** Type: **Oral**

Searching for sources of high-energy neutrinos with Swift

Wednesday, December 7, 2016 10:10 AM (20 minutes)

The IceCube high-energy neutrino observatory has reported a 6.5σ discovery of the first high-energy astrophysical neutrino candidates. However, the nature of the sources responsible for these neutrinos – potentially also the sources of the highest-energy cosmic rays – is still unknown and no high-confidence counterparts to any of the neutrino events have been yet identified. If the sources producing these highest-energy cosmic neutrinos are transient, they may be identifiable in rapid-response observations at Swift. We will present our proposed program that carries out prompt searches for X-ray and UV/optical counterparts to IceCube neutrinos with Swift.

Author: Dr KEIVANI, Azadeh (The Pennsylvania State University)

Presenter: Dr KEIVANI, Azadeh (The Pennsylvania State University)

Session Classification: Multi-Messenger Astronomy

Track Classification: HAP Workshop

Contribution ID: **14** Type: **Oral**

Photon searches with the Pierre Auger Observatory and the connection to TeV gamma-ray observations

Friday, December 9, 2016 3:50 PM (20 minutes)

The Pierre Auger Observatory, located in Argentina, provides an unprecedented integrated aperture for the search of photons with energy above 100 PeV. In this contribution recent results are presented with a focus on directional searches for photon point sources. The derived limits are of considerable astrophysical interest: Diffuse limits place severe constraints on top-down models and start to touch the predicted GZK photon flux range while directional limits can exclude the continuation of the electromagnetic flux from measured TeV sources with a significance of more than 5σ and set upper limits on the maximum cutoff energy of the source. By taking into account multi-wavelength information the sensitivity can be further increased.

Author: KUEMPEL, Daniel (RWTH Aachen University)

Presenter: KUEMPEL, Daniel (RWTH Aachen University)

Session Classification: MWL and Multi-Messenger

Track Classification: HAP Workshop

Contribution ID: **15** Type: **Oral**

Bimodal radio variability in OVRO-40m-monitored blazars

Thursday, December 8, 2016 9:30 AM (20 minutes)

Blazars are known to show periods of quiescence followed by extreme outbursts seen throughout the electromagnetic spectrum. We present a novel maximum likelihood approach to capturing this bimodal behavior by examining blazar radio variability in the flux-density domain. We separate quiescent and flaring components of a source's light curve by modeling its flux-density distribution as a series of "off" and "on" states. Our modeling allows us to extract information regarding the flaring ratio (S_{on}/S_{off}), duty cycle, and the modulation index in the "off"-state, in the "on"-state, as well as throughout the monitoring period of each blazar. We apply our method to a flux-density-limited subsample from the Owens Valley Radio observatory's 15 GHz blazar monitoring program, and explore differences in the variability characteristics between the different classes of blazars as well as gamma-ray detected and non-detected sources.

Author: Mr LIODAKIS, Ioannis (University of Crete, FORTH)

Presenter: Mr LIODAKIS, Ioannis (University of Crete, FORTH)

Session Classification: Variability Methods

Track Classification: HAP Workshop

Contribution ID: **16** Type: **Poster**

The upgrade of the Pierre Auger Observatory and its impact on gamma-ray searches

The Pierre Auger Observatory successfully measures cosmic-ray air-showers at the highest energies and sets the best limits for the photon flux in the EeV range. Currently, the Pierre Auger Observatory is a hybrid detector consisting of 1660 water-Cherenkov detectors deployed over an area of 3000 km^2 and four fluorescence detector sites where the atmosphere above the surface detector is observed. Despite its good performance, an upgrade is planned to allow for a measurement of the muon-to-electron ratio not only on a statistical base but for each shower individually. This will largely improve the ability of identifying the types of the primary particle.
For the upgrade, a scintillator detector will be deployed on top of each water-Cherenkov detector. The different response to the muonic and electromagnetic shower contributions of the two detector components allows for an event-by-event determination of the type of the primary particle. An improvement of current gamma-ray searches at the highest energies can thus be expected.

Author: Mr KEMP, Julian (RWTH Aachen University)

Presenter: Mr KEMP, Julian (RWTH Aachen University)

Track Classification: AMON Workshop

Contribution ID: **17** Type: **Oral**

Multi-frequency blazar variability from decades to minutes

Thursday, December 8, 2016 10:10 AM (20 minutes)

The typical shape of blazar lightcurves' power spectra is a power-law, $P(f) = Af^{-\beta}$, where A is the normalization and β is the slope, indicating that the variability is generated by the underlying $stochastic$ processes which is of colored noise type (i.e., $\beta \simeq 1-3$). Here we present the results of power spectral analysis of 5 blazars utilizing the $Fermi$-LAT survey at high energy $\gamma-$rays, $Swift$-XRT and $RXTE$-PCA data at X-rays, several ground based observatories and Kepler data at optical and single-dish radio telescopes operating at GHz frequencies (UMRAO and OVRO programmes). The novelty of our approach is that at optical regime, by combining long-term (historical optical light curves) and densely sampled intra-night lightcurves, the PSD characterisitics are investigated for temporal frequencies ranging over 7 orders of magnitude. Our analysis reveals that : (1) nature of processes generating flux variability at optical/radio frequencies is different from those at GeV freqeuncies ($\beta \sim 2$ and 1, respectively); this could imply, that $\gamma-$ray variability, unlike the Synchrotron (radio-to-optical) one, is generated by superposition of two stochastic processes with different relaxation timescales, (2) the main driver behind the optical variability is same on years, months, days, and hours timescales ($\beta \sim 2$), which argues against the scenario where different drivers behind the long-term flux changes and intra-night flux changes are considered, such as internal shocks due to the jet bulk velocity fluctuation (long-term flux changes) versus small-scale magnetic reconnection events taking place at the jet base (intra-night flux changes). Implications of these results are discussed in the context of blazar emission models.

Author: Dr GOYAL, Arti (Astronomical observatory of the Jagiellonian University)

Presenter: Dr GOYAL, Arti (Astronomical observatory of the Jagiellonian University)

Session Classification: Variability Methods

Track Classification: HAP Workshop

Contribution ID: **18** Type: **Oral**

Monitoring the TeV Gamma-Ray Sky with HAWC

Wednesday, December 7, 2016 2:45 PM (30 minutes)

The High Altitude Water Cherenkov (HAWC) observatory is a wide field-of-view gamma-ray detector that performs monitoring of two thirds of the sky every day at energies between 0.1 and 100 TeV.
Operating in its full configuration since March 2015, with a duty cycle of approximately 90%, HAWC has already accumulated an unprecedented data set of unbiased and evenly sampled daily TeV light curves. We will discuss how we use these results to characterize variability in various sources and focus on the study of flux states for the Blazars Markarian 421 and Markarian 501.
With HAWC, we also monitor the gamma-ray flux of selected objects in near real time with flare search algorithms running on the computing infrastructure at the HAWC site. We have started to send out alerts for HAWC flare detections and followed up on external alerts, for example neutrino triggers from IceCube. We will present the highlights of these ongoing multi-wavelength and multi-messenger monitoring efforts.

Author: Dr LAUER, Robert (University of New Mexico)

Presenter: Dr LAUER, Robert (University of New Mexico)

Session Classification: Gamma-Ray Astronomy

Track Classification: HAP Workshop

Contribution ID: **19** Type: **Oral**

Multimessenger Studies of Blazars

Friday, December 9, 2016 2:20 PM (20 minutes)

Active galactic nuclei often show relativistic outflows of matter, called jets. We study their simultaneous radio to gamma-ray spectral energy distributions (SEDs) from the
TANAMI sample, with over 80 SEDs for 22 sources. The large amount of monitoring data from the TANAMI project allows us to construct dynamic SEDs, highlighting spectral changes in varying flux states. With the data, we can further address key questions in AGN jet physics like the existence of the blazar sequence and the Fermi blazar's divide, the fundamental plane of black hole masses and the origin of the "big blue bump".

In high flux states the sources do not seem to follow the blazar sequence, suggesting a change in the jet. We find disagreements with the Big Blue Bump originating in thermal
emission from the accretion disk. We further observe that the fundamental plane does not work well as an estimator of the black hole mass, or the black hole mass is severely overestimated by SED fitting for some of the sources.

Author: Dr KRAUSS, Felicia (GRAPPA & API, UvA)

Co-authors: Prof. WILMS, Joern (Dr Remeis Observatory & ECAP / FAU Erlangen); Prof. KADLER, Matthias (Univ. Wuerzburg); Dr SCHULZ, Robert (ASTRON); Dr OJHA, Roopesh (NASA GSFC)

Presenter: Dr KRAUSS, Felicia (GRAPPA & API, UvA)

Session Classification: MWL and Multi-Messenger

Track Classification: HAP Workshop

Contribution ID: **20** Type: **Poster**

Long-term optical polarimetric monitoring of TeV blazars from San Pedro Mártir Observatory, Mexico

We carried out a long-term (2007-2016) polarimetric monitoring in the optical R-band of 37 bright blazars (12 mag < m(R) <18 mag) using the 84-cm telescope at San Pedro Martir Observatory in Mexico. Data were obtained using an optical single beam polarimeter as part of the GASP-WEBT collaboration. Some of the photometric data and few polarization data points were previously published in GASP-WEBT consortium papers. The whole set of data is now being analyzed and new results will be published in the near future.

Author: Dr HIRIART, David (Landessternwarte Königstuhl (LSW), Heidelberg University)

Co-authors: Dr BENITEZ, Erika (Universidad Nacional Autnoma de Mexico); Dr HEIDT, Jochen (LSW); Dr LOPEZ, Jose Manuel (Universidad Nacional Autonoma de Mexico); Dr MUJICA, Raul (Instituto Nacional de Astrofisica Optica y Electronica (INAOE))

Presenter: Dr HIRIART, David (Landessternwarte Königstuhl (LSW), Heidelberg University)

Track Classification: AMON Workshop

Contribution ID: **21** Type: **Oral**

INTEGRAL search for gamma-ray counterparts of gravitational wave and neutrino events

Friday, December 9, 2016 3:30 PM (20 minutes)

Observations of the INTErnational Gamma-Ray Astrophysics Laboratory (INTEGRAL) allow us to put upper limits on the gamma-ray and hard X-ray emission associated with the gravitational wave events, reported by LIGO/Virgo collaboration, as well as with exceptional high energy neutrino events detected by IceCube. Large duty cycle of INTEGRAL, stable background, and quasi-omnidirectional sensitivity of INTEGRAL/SPI-ACS and IBIS prove to be especially valuable in searches for counterparts of multi-messenger transients. We also discuss the potential of INTEGRAL for performing pointed observations of the GW and high-energy neutrino sources. INTEGRAL high-energy imaging instruments, IBIS, SPI, and JEM-X, give an opportunity to search for both prompt and long-lasting electromagnetic counterparts of various transient events over 3 decades in energy, from 5 keV to 8 MeV.

Author: Dr SAVCHENKO, Volodymyr (APC)

Presenter: Dr SAVCHENKO, Volodymyr (APC)

Session Classification: MWL and Multi-Messenger

Track Classification: HAP Workshop

Contribution ID: **22** Type: **Oral**

Gamma-ray Emission From Non-Blazar AGNs

Detection of high energy gamma-ray emissions from non-blazar active galactic nuclei (AGN) with Fermi LAT shows, that these are different and potentially very interesting classes of gamma-ray emitters. This provides an alternative approach for studying the high energy emission processes compared to blazars where the emission is strongly Doppler boosted. Up to now there are 27 non-blazar AGNs detected in the gamma-ray band which are included in the third catalog of AGNs detected by Fermi LAT. I will present detailed investigation of the gamma-ray emission from non-blazar AGNs (FRI, FRII and NLSy1) based on seven years of Fermi LAT data.The accumulation of a larger data set allows studying the spectrum with better statistics at energies above several GeV. The results from temporal analysis using light curves with time bins of fixed widths and with an adaptive binning method will be presented. Also, the origin of the observed gamma-rays will be discussed considering both compact and extended regions.

Author: Dr SAHAKYAN, Narek (ICRANet-Armenia)

Presenter: Dr SAHAKYAN, Narek (ICRANet-Armenia)

Track Classification: HAP Workshop

Contribution ID: **23** Type: **Oral**

The RoboPol Optical Polarization Monitoring Program

Thursday, December 8, 2016 4:40 PM (30 minutes)

Optical Synchrotron emission from blazars is significantly polarized and the polarization probes the magnetic field structure in the jet. Rotations of the polarization angle in blazars reveal important information about the evolution of disturbances responsible for blazar flares. The RoboPol program for the polarimetric monitoring of statistically complete samples of blazars was developed in 2013 to systematically study this class of events. RoboPol is a collaboration between the University of Crete, Caltech, the Max-Planck Institute for Radio Astronomy, the Inter-University Centre for Astronomy and Astrophysics in India, and the Nicolaus Copernicus University in Poland. Using a novel polarimeter operating at the 1.3m telescope of the Skinakas Observatory in Crete, it has succeeded in its 4 years of operation in taking optopolarimetric rotations of blazars from novelty status to a well-studied phenomenon that can be used to answer long-standing questions in our theoretical understanding of jets. I will review the RoboPol program and its most important results in the classification of the optopolarimetric properties of blazars, the statistical properties of polarization rotations, and their relation to gamma-ray activity in blazar jets.

Author: Prof. PAVLIDOU, Vasiliki (University of Crete)

Presenter: Prof. PAVLIDOU, Vasiliki (University of Crete)

Session Classification: Optical Astronomy

Track Classification: HAP Workshop

Contribution ID: **24** Type: **Oral**

The University of Michigan Centimeter-band Blazar Monitoring Program: multi-frequency, time-resolved, flux and polarization observations as probes of the physical conditions in blazar jets

Wednesday, December 7, 2016 4:45 PM (30 minutes)

The University of Michigan 26-m paraboloid (UMRAO) was dedicated to observations of AGN, primarily of the blazar class, for nearly 40 years providing continuous light curves for hundreds of sources. In 1977 the telescope was placed under automatic computer control permitting nearly round-the-clock operation and systematically-obtained measurements of both linear polarization and total flux density at 4.8, 8, and 14.5 GHz. The sampling probes variations on time scales of weeks to months, with the individual observing cadence selected on the basis of activity; both flux-limited samples and targeted, flaring blazars were observed. During 2002-2012 multi-frequency circular polarization observations were also obtained for a sample of bright (S>5 Jy), flaring sources. Analysis of time segments of the total flux density data have identified characteristic variability time scales of a few years, and quasi-periodicity. Cross-correlations of the UMRAO data with X-ray and gamma-ray light curves have been used for localization of the high energy emission and are most successful in identifying causally-related flares when multi-year data trains containing strong flares are included. The co-spatiality of the optical and radio-band emission has been investigated during contemporaneous GeV-flaring by looking for correlated variations in the optical and 14.5 GHz electric vector position angle light curves indicative of similar local magnetic field orientation; a similar approach has potential for the high energy bands when well-determined, high-cadence polarimetry becomes available. The UMRAO data support a scenario in which the quiescent jet in the blazar zone contains a turbulent magnetic field which is compressed and ordered by propagating shocks during strong flares. Radiative transfer modeling incorporating this scenario is being used to elucidate the intrinsic flow conditions during gamma-ray flaring.

Author: Dr ALLER, Margo (University of Michigan)

Co-authors: Prof. ALLER, Hugh (University of Michigan); Dr HUGHES, Philip (University of Michigan)

Presenter: Dr ALLER, Margo (University of Michigan)

Session Classification: Radio Astronomy

Track Classification: HAP Workshop

Contribution ID: **25** Type: **Oral**

OVRO blazar monitoring programs

Wednesday, December 7, 2016 5:45 PM (20 minutes)

Since 2008, the 40-m telescope at Owens Valley Radio Observatory in California has been used to monitor a large number of blazars at 15 GHz. The program started with 1158 candidate gamma-ray sources and has been extended now to monitor over 1800 blazars, including all Fermi 1FGL and 2FGL sources and TeV emitters, with twice per week cadence. The data of this program have been used in more than 80 publications showing their value for the blazar community. In May 2014, a new receiver covering 13-18 GHz and capable of spectrometric linear polarization measurements was installed. I will present some recent highlights from the program, and describe a new planned monitoring program where two 10.4-m telescopes previously used in the CARMA array will be used to monitor blazars at 3mm and 1mm wavelengths in full polarization mode.

Author: Dr HOVATTA, Talvikki (University of Turku)

Co-authors: Prof. READHEAD, Anthony (California Institute of Technology); Dr RICHARDS, Jennifer (California Institute of Technology); Dr REEVES, Rodrigo (Universidad de Concepción); Dr PEARSON, Timothy (California Institute of Technology); Dr MAX-MOERBECK, Walter (Max Planck Institute for Radioastronomy)

Presenter: Dr HOVATTA, Talvikki (University of Turku)

Session Classification: Radio Astronomy

Track Classification: HAP Workshop

Contribution ID: **26** Type: **Oral**

Monitoring of VHE blazars with H.E.S.S.

Wednesday, December 7, 2016 3:35 PM (20 minutes)

A key project of the High Energy Stereoscopic System (H.E.S.S.) is the regular monitoring of different types of blazars at very high energies (E>100 GeV). Since the inauguration of H.E.S.S. in 2004 the high-frequency peaked BL Lac object PKS 2155-304 and the radio galaxy M 87 have been observed frequently. The flat spectrum radio quasar PKS 1510-089 has been added to the list of monitored sources after its detection during a flare in 2009. In this talk, recent results of these monitoring efforts will be presented, including evidence that the quiescent and flaring states differ in more than merely flux levels in PKS 2155-304. This points to different processes producing these states. Monitoring with H.E.S.S. phase II of PKS 1510-089 in 2015 revealed for the first time VHE night-by-night variability in this source, implying that the flaring region must be located on the edge or beyond the broad line region.

Author: Dr ZACHARIAS, Michael (North-West University)

Co-author: COLLABORATION, H.E.S.S. (H.E.S.S. collaboration)

Presenter: Dr ZACHARIAS, Michael (North-West University)

Session Classification: Gamma-Ray Astronomy

Track Classification: HAP Workshop

Contribution ID: **27** Type: **Oral + Poster**

F-GAMMA program: multi-frequency radio monitoring of Fermi blazars

Friday, December 9, 2016 11:50 AM (20 minutes)

Motivated by the advent of Fermi gamma-ray space telescope and the potential of multi-energy studies of AGN, we initiated in January 2007 a monthly multi-frequency radio monitoring of almost 100 gamma-ray blazars. The observations were being conducted primarily wit the Effelsberg 100-m, the IRAM Pico Veleta 30-m and less regularly the APEX 12-m telescopes in the frequency range from 2.6 to 345 GHz. The resulting dataset is characterized by an effective cadence of a measurement every 1.3 months with a coherence of the resulting radio SEDs of better than 10 days. The monitoring has been conducted in linear and circular polarization mode.

This effort which culminated in January 2015 with the completion of the nominal operation of the program resulted a vast dataset that is being explored. In this talk I aim at reviewing the program and discuss some of the most noteworthy findings, such as:

- the detection of a statistically rigorous correlation between gamma-rays and radio flux densities
- the detection of a correlation of radio and gamma-ray light curves which allowed us to constrain the location of the gamma-ray production site
- the unification of the spectral variability patterns to small number of classes all of which are explainable with the operation of shocks in the jet
- the modeling of the multi-frequency circular and linear polarization light curves with full-Stokes radiative transfer
- the detection of blazar-like jets from Narrow Line Seyfert galaxies

Author: Dr ANGELAKIS, Emmanouil (Max-Planck-Institut für Radioastronomie)

Co-authors: Prof. ZENSUS, J. Anton (Max-Planck-Institut für Radioastronomie); Dr FUHRMANN, Lars (Max-Planck-Institut für Radioastronomie)

Presenters: Dr ANGELAKIS, Emmanouil (Max-Planck-Institut für Radioastronomie); Dr MYSERLIS, Ioannis (Max Planck Institut für Radioastronomie)

Session Classification: Radio Astronomy

Track Classification: HAP Workshop

Contribution ID: **28** Type: **Oral**

Multi-waveband study of TeV blazar 1ES1959+650 during a high state in 2016

Wednesday, December 7, 2016 12:35 PM (20 minutes)

The nearby TeV Blazar 1ES 1959+650 (z=0. 047) is a high-peaked BL Lacertae object and one of the prime sources which has been monitored at VHE gamma-ray energies by FACT. This source is well known for its orphan flare in June 2002, which makes this an unique source. It was found 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 had started showing enhanced activity in VHE gamma-rays during summer 2015 and reached a high flux state during summer of 2016. A few very bright flares were observed by FACT in June and July 2016. In the presentation, we will discuss the multiwaveband behavior of 1ES 1959+650 and evolution of the high state. A physical model,with which several flaring episodes can be explained, will also be discussed.

Author: Dr SHUKLA, Amit (Institut für Theoretische Physik und Astrophysik, Universität Würzburg)

Co-author: COLLABORATION, FACT (ETH, ISDC, TU, WU)

Presenter: Dr SHUKLA, Amit (Institut für Theoretische Physik und Astrophysik, Universität Würzburg)

Session Classification: Multi-Wavelength Astronomy

Track Classification: HAP Workshop

Contribution ID: **29** Type: **Poster**

Multiwaveband study of FSRQ B3 1708+433

A multiwavelength study of the Flat Spectrum Radio Quasar (FSRQ) B3 1708+433 (z=1.027), also known as CGRaBS J1709+4318, has been performed using 7 years of Fermi-LAT observations. A few GeV gamma ray flares are observed during this period . These flares are analyzed and compared to understand their emission mechanisms. An energy dependent flux variability of the source is studied. The correlation between gamma ray and radio flux of the source is also investigated.

Author: Dr ROY, Jayashree (UM-DAE Center for Excellence in Basic Sciences)

Co-author: Dr SHUKLA, Amit (Institut für Theoretische Physik und Astrophysik, Universität Würzburg)

Presenters: Dr SHUKLA, Amit (Institut für Theoretische Physik und Astrophysik, Universität Würzburg); Dr ROY, Jayashree (UM-DAE Center for Excellence in Basic Sciences)

Track Classification: HAP Workshop

Contribution ID: **30** Type: **Oral**

Optical study of blazars

To study optical variability of extragalactic objects since 1997 we are conducting in Abastumani Observatory a long-term campaign using dedicated telescopes, which allowed to collect ~300 000 CCD frames during ~2 900 nights. This extensive monitoring campaign over 100 blazars during first five years was carried out in BVRI bands and later on from 2002 mainly in R band using the 70-cm meniscus (f/3, SBIG ST6 and Apogee Ap6E) and 125-cm Ritchey-Chretien (f/13, Apogee Ap6E) telescopes. The list of sources includes blazars detected from Radio to TeV band. Most densely sampled sources are BL Lacertae, S5 0716+714, Mrk 421, Mrk 501, Pg 1553+113, 1ES 1959+650, 1ES 2344+514 and others. The frames have been reduced using Daophot II and homogenous sample of light curves have been constructed. Most sources show wide range of variability (long-term, IDV and micro-variability). The results of multiwavelength campaigns with Whipple, VERITAS, AGILE, FERMI, SWIFT, HESS and MAGIC are also presented. To extend in the future optical photometric, polarimetric and spectral survey of fainter sources with high temporal resolution the purchase of two PanSTAR like telescopes are also considered.

Author: Mr KURTANIDZE, Omar (Abastumani Observatory)

Presenter: Mr KURTANIDZE, Omar (Abastumani Observatory)

Track Classification: HAP Workshop

Contribution ID: **31** Type: **Oral**

Radio Monitoring Projects at Metsähovi Radio Observatory

Wednesday, December 7, 2016 5:15 PM (30 minutes)

I will present the ongoing blazar monitoring programme and other AGN observing projects of Aalto University Metsähovi Radio Observatory (MRO) in Finland.

MRO has been operational for more than 40 years now, and even though we struggle with decreasing funding for basic research just like many other research units nowadays do, our streamlined operations and flexibility allow for a multitude of different kinds of observing projects.

The backbone of our observing programme is the dense, long term monitoring of approximately one hundred blazars at 37 GHz (and somewhat less at 22 GHz). But in addition to that, we carry out also many other AGN observing projects, trying to optimally use the observing time between the core monitoring sample, some "high-risk" projects involving faint sources or large samples, as well as Target-of-Opportunity projects that call for a quick response.

In recent years, the focus of our research has been in multifrequency studies related to the Planck satellite's extragalactic foreground source programme, and radio to gamma-ray connection in blazars. Currently we are also observing samples of younger radio sources, such as Gigahertz Peaked Spectrum sources and Narrow-Line Seyfert 1 galaxies.
I will describe our observing programmes and the science goals which ultimately aim for a better understading of blazar unification and evolution.

Author: Dr TORNIKOSKI, Merja (Aalto University Metsahovi Radio Observatory)

Presenter: Dr TORNIKOSKI, Merja (Aalto University Metsahovi Radio Observatory)

Session Classification: Radio Astronomy

Track Classification: HAP Workshop

Contribution ID: **32** Type: **Oral**

AMON: real-time operations

Wednesday, December 7, 2016 9:20 AM (30 minutes)

The Astrophysical Multimessenger Observatory Network (AMON) will link the world's leading high-energy neutrino, cosmic-ray, gamma-ray and gravitational wave observatories by performing real-time coincidence searches for multimessenger sources from observatories' subthreshold data streams. The resulting coincidences will be distributed to interested parties in the form of electronic alerts for real-time followup observation. We will present the science case, design elements, current and projected partner observatories, status of the AMON project, and current AMON-enabled analyses. We have deployed new high-uptime servers in February 2016 and started issuing real-time alerts via Gamma-ray Coordinates Network (GCN) since late spring 2016.

Author: TEŠIĆ, Gordana (Penn State University)

Presenter: TEŠIĆ, Gordana (Penn State University)

Session Classification: Multi-Messenger Astronomy

Track Classification: HAP Workshop

Contribution ID: **33** Type: **Oral**

The location of the gamma-ray emission site in blazars from radio and gamma-ray monitoring

Thursday, December 8, 2016 11:45 AM (20 minutes)

I will discuss our efforts to determine the location of the gamma-ray emission site in blazars with the ongoing OVRO 40 meter telescope blazar monitoring program. This program started in 2008 and is currently monitoring about 1800 blazars at 15 GHz with twice a week cadence for a sample including most of the bright blazars north of declination -20 degrees. A summary of previous findings and preliminary results on our analysis of 8 years of Fermi-LAT and OVRO light curves for the brightest sources will be presented. The emphasis will be on the characterization of the variability in the radio band, and its correlation to gamma-ray emission as observed with Fermi-LAT. The study of these correlations can provide constrains on the location of the gamma-ray emission region, but require careful consideration of the statistics that we will also discuss.

Author: MAX-MOERBECK, Walter (Max-Planck-Institut für Radioastronomie)

Co-authors: READHEAD, A. C. S. (Caltech); ZENSUS, J. A. (MPIfR); RICHARDS, J. L. (Purdue U.); REEVES, R. (Universidad de Concepcion); PEARSON, T. J. (Caltech); Dr HOVATTA, Talvikki (Aalto University)

Presenter: MAX-MOERBECK, Walter (Max-Planck-Institut für Radioastronomie)

Session Classification: Variability Methods

Track Classification: HAP Workshop

Contribution ID: **34** Type: **Oral**

Physics of extragalactic plasma elements through multi-frequency linear and circular radio polarization monitoring

Friday, December 9, 2016 12:10 PM (20 minutes)

The radio emission of active galactic nuclei (AGN) jets is polarized due to the incoherent synchrotron radiation mechanism. The linear and circular polarization parameters are directly related with the physical conditions (magnetic field strength and topology, particle density and plasma composition) both in the jet as well as any magnetized plasma regions along the line of sight. However, detecting their polarization properties is a challenging endeavor due to their low levels and possible depolarization effects.

We have developed an end-to-end data analysis methodology to recover the polarization properties of unresolved sources with high accuracy. It has been applied to recover the linear and circular polarization of 87 AGNs measured by the F-GAMMA monitoring program from July 2010 to January 2015 with a mean cadence of 1.3 months. Their linear polarization was recovered at four frequencies between 2.64 and 10.45 GHz and the circular polarization at 4.85 and 8.35 GHz.

The physical conditions required to reproduce the observed polarization properties and the processes which induce their variability were investigated with a polarized radiative transfer code which emulates the synchrotron emission of modeled jets. Here we present our first results on modeling the full-Stokes variability of the blazar 3C 454.3, assuming that it can be attributed to evolving internal shocks propagating downstream.

Authors: Dr ANGELAKIS, Emmanouil (Max Planck Institut für Radioastronomie); Dr MYSERLIS, Ioannis (Max Planck Institut für Radioastronomie)

Presenter: Dr MYSERLIS, Ioannis (Max Planck Institut für Radioastronomie)

Session Classification: Radio Astronomy

Track Classification: HAP Workshop

Contribution ID: **35** Type: **Oral**

Blazar Monitoring with FACT

Friday, December 9, 2016 9:15 AM (30 minutes)

The First G-APD Cherenkov Telescope (FACT) is pioneering the usage of solid state photo sensors (G-APD aka SiPM) for measuring the dim flashes of Cherenkov light initiated by the interaction of a high energetic particles or photons with the atmosphere. One advantage of these sensors is that they donot degrade even when exposed to bright light. Therefore, FACT can operate with standard setup also under strong moonlight conditions. In the past five years, the operation of FACT has been very smooth and got automatized to a large extent, resulting in a data taking efficiency reaching 95% if weather permits. Temperature dependencies of the sensors are well under control without the need of any temperature stabilization system, resulting in very stable data taking conditions. This makes FACT an ideal device for unbiased long-term monitoring of variable sources of very high-energy gamma-ray emission.
While the sensitivity of FACT is limited by the small mirror area of ~9.5m^2, it is sufficient to measure the emission from the brightest Blazars like Mrk421, Mrk501 and 1ES1959 and alerting the community in case of bright flares.

While Mrk421 and Mrk501 showed several flaring episodes over the last years, 1ES1959+650 was in a low state for the first three years. In 2015 an increase of the flux was observed, and in 2016, several bright outbursts have been recorded.

In this presentation, the results of five year of unbiased Blazar monitoring will be presented.

Author: Prof. BILAND, Adrian (ETH Zurich)

Co-author: FACT COLLABORATION, . (.)

Presenter: Mr BUSS, Jens (Tu Dortmund, Exp. Physik 5b)

Session Classification: Gamma-Ray Astronomy

Track Classification: HAP Workshop

Contribution ID: **36** Type: **Oral**

Constraining the spectral-type of the the GRS 1758-258 optical counterpart

GRS 1758-258 is a prototypical microquasar near the Galactic Center whose non-degenerate optical counterpart was believed to be a late-type giant star. The system has remained poorly studied at optical wavelengths because it is very faint and strongly absorbed. In this work, we present the results of long-slit spectroscopy at low resolution with a 10 m class telescope (GRANTECAN). Details and implications will be presented. The optical counterpart of GRS 1758-258 appears to be consistent with a mid-A main sequence star, and we tentatively suggest a possible connection of this system with the category of intermediate-mass X-ray binaries.

Author: Prof. LUQUE-ESCAMILLA, Pedro Luis (University of Jaén)

Co-authors: Prof. MARTÍ, Josep (University of Jaén); Dr MUÑOZ-ARJONILLA, Álvaro (Research Group FQM-322)

Presenter: Prof. LUQUE-ESCAMILLA, Pedro Luis (University of Jaén)

Track Classification: HAP Workshop

Contribution ID: **37** Type: **Oral**

Counterpart candidates to unassociated gamma-ray sources: the case of 3FGL J0133.3+5930

Thursday, December 8, 2016 5:30 PM (20 minutes)

The identification of high energy sources in the Galactic Plane is often a difficult but rewarding task as it can lead to the discovery of exotic stellar accelerators, such as gamma-ray binaries and microquasars. Here, we report a multi-wavelength analysis of the unassociated Fermi source 3FGL J0133.3+5930 at low galactic latitude. Two candidate counterparts have been identified inside its 95% confidence ellipse. One of them is the AGN source 2MASS 01325529+5932158 at a redshift $z = 0.1143$. This object could be a low-luminosity blazar although this point remains to be confirmed. The other one is the bright Be star LS I+59 79 (V =10.7), also known as TYC 3683-985-1, whose eclipsing binary nature is reported in this work. With a photometric period of 1.94 d, its multi-colour light curves are apparently consistent with a semi-detached binary system with two early-type components. Possible gamma-ray emission mechanisms are tentatively proposed in a stellar context that, at present, does not fully match a typical gamma-ray binary scenario. However, this situation could change when further spectroscopic data are available that better constrain the nature of the system components.

Author: Prof. MARTÍ, Josep (University of Jaén)

Co-authors: Mr GALINDO, Daniel (University of Barcelona); Prof. PAREDES, Josep M. (University of Barcelona); Prof. IWASAWA, Kazushi (ICREA-ICCUB); Dr RIBÓ, Marc (University of Barcelona); Prof. LUQUE-ESCAMILLA, Pedro Luis (University of Jaén)

Presenter: Prof. MARTÍ, Josep (University of Jaén)

Session Classification: Optical Astronomy

Track Classification: HAP Workshop

Contribution ID: **38** Type: **Poster**

Optical photometry of high-energy sources from a College Observatory

We present a technical description of the Astronomical Observatory of the University of Jaén (UJA). Equipped with a 41 cm Schmidt-Cassegrain telescope on a robotic equatorial mount, this instrument is mainly devoted to educational tasks for Astronomy students and long-term photometric monitoring for research purposes. Outreach activities are also occasionally carried out, and a live all-sky camera is also maintained. The main detector is a commercial CCD camera hosting an UBVRI filter wheel. The photometric transformation coefficients, zero points and average extinction values of the observatory have been accurately determined by imaging standard stars under clear observing conditions during 2015-2016. Despite its location in a light polluted area, the instrument has performed remarkably well and differential photometry at the 0.01-0.02 mag accuracy level is regularly achieved for bright targets ($V \leq 12$). Several gamma-ray binaries and related systems (LS I +61303, LS 5039, MWC656, …) are currently under monitoring. In the past year, the UJA observatory contributed to the optical follow-up of the black hole transient V404 Cygni in outburst. More recently, these UJA facilities have been key at identifying the Be star system LS I +59 79 as an eclipsing Be star inside the error ellipse of the unassociated gamma-ray source 3FGL J0133.3+5930.

Author: Prof. MARTÍ, Josep (University of Jaén)

Co-authors: Prof. MARTÍNEZ-AROZA, José (University of Granada); GARCÍA-HERNÁNDEZ, María R. (University of Jaén); Prof. LUQUE-ESCAMILLA, Pedro Luis (University of Jaén)

Presenter: Prof. MARTÍ, Josep (University of Jaén)

Track Classification: HAP Workshop

Contribution ID: **39** Type: **Oral**

Gamma-ray Novae: Rare or Nearby?

Wednesday, December 7, 2016 3:55 PM (20 minutes)

Classical Novae were revealed as a surprise source of γ-rays in *Fermi* LAT observations. During the first 8 years since the LAT was launched, 6 novae in total have been detected to $> 5\sigma$ in γ-rays, in contrast to the 69 discovered optically in the same period. We attempt to resolve this discrepancy by assuming all novae are γ-ray emitters, and assigning peak one-day fluxes based on a flat distribution of the known emitters to a simulated population. To determine optical parameters, the spatial distribution and magnitudes of bulge and disc novae in M31 are scaled to the Milky Way, which we approximate as a disc with a 20 kpc radius and elliptical bulge with semi major axis 3 kpc and axis ratios 2:1 in the xy plane. We approximate Galactic reddening using a double exponential disc with vertical and radial scale heights of $r_d = 5$ kpc and $z_d = 0.2$ kpc, and demonstrate that even such a rudimentary model can easily reproduce the observed fraction of γ-ray novae, implying that these apparently rare sources are in fact nearby and not intrinsically rare. We conclude that classical novae with $m_R \leq 12$ and within ≈ 8 kpc are likely to be discovered in γ-rays using the *Fermi* LAT.

Author: Mr MORRIS, Paul (University of Oxford)

Presenter: Mr MORRIS, Paul (University of Oxford)

Session Classification: Gamma-Ray Astronomy

Track Classification: HAP Workshop

Contribution ID: **40** Type: **Oral**

On the direct correlation between gamma-rays and PeV neutrinos from blazars

Friday, December 9, 2016 2:40 PM (20 minutes)

We study the frequently used assumption in multi-messenger astrophysics that the gamma-ray and neutrino fluxes are directly connected because they are assumed to be produced by the same photohadronic production chain. An interesting candidate source for this test is the flat-spectrum radio quasar PKS B1424-418, which recently called attention of a potential correlation between an IceCube PeV-neutrino event and its burst phase. We simulate both the multi-waveband photon and the neutrino emission from this source using a self-consistent radiation model. We demonstrate that a simple hadronic model cannot adequately describe the spectral energy distribution for this source, but a lepto-hadronic model with sub-dominant hadronic component can reproduce the multi-waveband photon spectrum observed during various activity phases of the blazar. As a conclusion, up to about 0.3 neutrino events may coincide with the burst, which implies that the leptonic contribution dominates in the relevant energy band. We also demonstrate that the time-wise correlation between the neutrino event and burst phase is weak.

Author: Dr GAO, Shan (DESY)

Co-authors: Prof. POHL, Martin (DESY and U Potsdam); Prof. WINTER, Walter (DESY)

Presenter: Dr GAO, Shan (DESY)

Session Classification: MWL and Multi-Messenger

Track Classification: HAP Workshop

Contribution ID: **41** Type: **Poster**

FACT - Observations at Large Zenith Distance

The First G-APD Cherenkov Telescope (FACT) is observing bright blazars at TeV energies. One main goal of the project is the long-term monitoring of the brightest TeV-sources in the sky. To obtain a continuous and unbiased data sample, a small sample of sources is observed as much as possible. For data at the beginning and end of the observation window and for sources with large declination, this results in data with large zenith distance. For example, 1ES 1959+650 culminates at 35 degree. Larger zenith distance has an influence on the background suppression as the characteristics of the shower images change. To study these characteristics, a data sample of the Crab Nebula, a standard-candle at TeV energies, is used. The background suppression is optimized providing a more sensitive analysis data with large zenith distance. The method is tested on Crab Nebubla data and then applied to data of other sources.

Author: Mr SCHLEICHER, Bernd (Universität Würzburg)

Co-author: COLLABORATION, FACT (ETH Zurich, ISDC, TU Dortmund, Universität Würzburg)

Presenter: Mr SCHLEICHER, Bernd (Universität Würzburg)

Track Classification: HAP Workshop

Contribution ID: **42** Type: **Poster**

FACT - Observations of the Blazar 1ES 1959+650

The First G-APD Cherenkov Telescope (FACT) has been monitoring the blazar 1ES 1959+650 since 2012.
While the source was found in a low state in the first three years,
a major flaring activity was detected in 2016 with several outbursts.
In total there are more than 1000 hours of observations on this source.
It has been observed at high zenith angles and also during bright moon.
The data sample includes more than 250 hours of data at zenith angles of more than 40° and about 150 hours with very bright moon.
Observations performed under these conditions have an increased trigger threshold.
Given the power law spectra of the source, this results in a reduced gamma rate.
In order to use these data in for example variability studies, this effect has to be corrected for.
While calculating fluxes involves Monte Carlo simulation, with a simple method the gamma rate can be corrected.
In the presented study, the results of a quick-loock analysis are used.
Therefore the zenith and thereshold dependencies of the Crab-Nebulas excess rate have been studied
and correction functions have been applied to the 1ES 1959+650 data sample.
The corrected rates can be used for further studies on the flaring period in 2016.

Author: Mr HERBST, Tobias (Universität Würzburg)

Co-author: COLLABORATION, FACT (ETH Zürich, ISDC, TU Dortmund, Universität Würzburg)

Presenter: Mr HERBST, Tobias (Universität Würzburg)

Track Classification: HAP Workshop

Contribution ID: **43** Type: **Oral**

Monitoring the Sky at soft Gamma-ray Energies with CGRO/COMPTEL for nine Years

Friday, December 9, 2016 10:15 AM (20 minutes)

The COMPTEL experiment aboard Compton Gamma-Ray Observatory (CGRO) explored the MeV sky (0.75 - 30 MeV) for more than 9 years between April 1991 and June 2000, providing a wealth of discoveries. Now, more than 16 years after the deorbit of CGRO, the COMPTEL data are still the forefront of our knowledge on the non-thermal soft gamma-ray sky (1 - 30 MeV), because no successor is operating.

The COMPTEL source catalog (Schönfelder et al. 2000) lists 32 steady sources, which raised to more than 40 sources up to now, the majority in source type are blazars. We will summarise the observational status (source counts, spectra, light curves) of COMPTEL sources at soft MeV energies with emphasis on blazars, including multifrequency spectra for selected sources. We'll also present new developments in the still ongoing COMPTEL data analyses,
focusing on polarization and state-of-the-art imaging techniques, and their scientific perspectives.

Author: Dr COLLMAR, Werner (MPE)

Presenter: Dr COLLMAR, Werner (MPE)

Session Classification: Gamma-Ray Astronomy

Track Classification: HAP Workshop

Contribution ID: **44** Type: **Oral**

VERITAS Observations of Active Galactic Nuclei

Wednesday, December 7, 2016 3:15 PM (20 minutes)

The Very Energetic Radiation Imaging Telescope Array System (VERITAS), located in southern Arizona USA, is an array of four 12-m diameter imaging atmospheric-Cherenkov telescopes dedicated to studying the very-high-energy (VHE, E > 100 GeV) gamma-ray sky. The investigation of Active Galactic Nuclei (AGN) is a key element of the VERITAS long-term science plan, with 34 detected by VERITAS to date. VERITAS regularly monitors known AGN through a program of regular observations, many in coincidence with observations made with the Swift-XRT X-ray telescope and optical telescopes, with the aim to build up large multi-year datasets on these objects with good multi-wavelength coverage. In addition, VERITAS has a target-of-opportunity (ToO) program to conduct intense observations during periods of enhanced activity, whether triggered by the VERITAS monitoring observations themselves or by multi-wavelength alerts. Details of the VERITAS observation program and recent result highlights will be presented.

Author: Mr O'BRIEN, Stephan (UCD Dublin)

Presenter: Mr O'BRIEN, Stephan (UCD Dublin)

Session Classification: Gamma-Ray Astronomy

Track Classification: HAP Workshop

Contribution ID: **45** Type: **Oral**

High-Energy Neutrinos from Gamma-Ray Bursts and Blazar Flares

Saturday, December 10, 2016 9:05 AM (20 minutes)

Gamma-ray bursts (GRB) and blazars are luminous point sources in gamma-rays and candidate sources for IceCube neutrinos. The potential spatial and temporal correlations between
the IceCube neutrinos and the gamma-ray flares from those sources have called attention and extensive studies. Due to the low statistics of neutrino events, it is important to interpret the results based on accurate modeling of the sources. Here I will
summarize the recent developments on theoretical models of GRBs and blazars and the correlation between their neutrino and gamma-ray emissions.

Author: Dr GAO, Shan (DESY)

Presenter: Dr GAO, Shan (DESY)

Session Classification: AMON Workshop

Track Classification: AMON Workshop

Contribution ID: **46** Type: **Oral**

Multimessenger studies of blazars

Saturday, December 10, 2016 3:30 PM (20 minutes)

The IceCube Collaboration has published results on a neutrino flux significantly in excess of the atmospheric background. Due to low atmospheric background at PeV energies, the highest energy events are the most likely ones to be of extraterrestrial origin. We use broadband spectra in the IceCube integration period to calculate the maximum expected number of neutrinos assuming a pion photoproduction model. We show that blazars as a class are capable of explaining the first two observed neutrino events at PeV energies. For the third event at PeV energies we find a flaring blazar in positional and temporal agreement. The energy output of PKS B1424-418 alone can explain the neutrino event, indicative of a physical association.

Author: Dr KRAUSS, Felicia (GRAPPA & API, UvA)

Co-authors: Prof. WILMS, Joern (Remeis Observatory&ECAP/FAU); Prof. MANNHEIM, Karl (Univ. Würzburg); Prof. KADLER, Matthias (Univ. Würzburg)

Presenter: Dr KRAUSS, Felicia (GRAPPA & API, UvA)

Session Classification: AMON Workshop

Track Classification: AMON Workshop

Contribution ID: **47** Type: **Oral**

High Energy Astrophysics with Novel Observables

Thursday, December 8, 2016 12:05 PM (20 minutes)

Despite intensive research over a few decades facilitated by highly sensitive multiwavelength (MWL) telescopes, fundamental characteristics of active galactic nuclei (AGNs) are still open. With respect to physics of individual AGNs, the location and mechanisms of particle acceleration, their connection to flaring, relative importance of hadronic and leptonic processes in specific sources and in general, and finally the fundamental features of variability are up for debate. As a population too, the frequency of flaring in AGNs at different wavelengths and characteristic patterns that are source independent is a subject of ongoing research. In this situation, quantifying characteristics such as variability in terms of novel statistical observables as the power spectral density and the flux probability distribution provides complementary constraints to the traditional energy spectrum, morphology and MWL lightcurve. In this presentation, I demonstrate the potential of using such statistical observables based on time-series methods simultaneously at different wavelengths as a means of both probing fundamental processes in individual AGNs as well as transient studies on their population. Limitations due to observational cadence are explored. Extending from individual MWL observations to population studies at specific wavelengths, prospects of transient and variability pattern detection are evaluated. Finally, mechanisms of particle acceleration and radiative processes leading to observed PSD and PDF are discussed.

Author: Dr CHAKRABORTY, Nachiketa (Max Planck Institute for Nuclear Physics)

Presenter: Dr CHAKRABORTY, Nachiketa (Max Planck Institute for Nuclear Physics)

Session Classification: Variability Methods

Track Classification: HAP Workshop

Contribution ID: **48** Type: **Oral**

The Blazar Sequence and Accretion Disk Winds.

Thursday, December 8, 2016 3:15 PM (20 minutes)

Adopting the hypothesis that the nonthermal emission of blazars is primarily due to the acceleration of electrons, we construct a simple leptonic model in order to explain the Blazar Sequence. The acceleration process is assumed to be of the first order Fermi type and the injected electrons and photons in the emitting region of the blazar are described by spatially averaged kinetic equations. According to the leptonic scenario, the spectral energy distributions of blazars have two basic components: a low frequency component, peaking in the optical through X-rays, from synchrotron emission; and a high frequency one, peaking in the ɣ rays, probably originating from Compton scattering of some seed photon source, either internal (synchrotron self-Compton) and/or external to the jet (external Compton). The origin of external photons is generally undetermined, attributed to BLR cloud emission. Motivated by recent works suggesting the presence of accretion disk winds with density profiles $n \propto 1/r$ and normalization proportional to $\dot{m}^2$(the normalized to Eddington mass flux in the wind), that allow the isotropization of the accretion disk photons over radii as large as $\sim$ 1 pc, we compute blazar SEDs for different values of $\dot{m}$. We find that the Blazar Sequence can then be represented adequately in terms of a single parameter, namely $\dot{m}$.

Author: Ms BOULA, Stella (University of Athens)

Co-authors: Prof. MASTICHIADIS, Apostolos (University of Athens); Dr KAZANAS, Demosthenes (NASA Goddard Space Flight Center, Laboratory for High Energy Astrophysics)

Presenter: Ms BOULA, Stella (University of Athens)

Session Classification: Modelling

Track Classification: HAP Workshop

Contribution ID: **49** Type: **Oral**

Studies on the VHE γ-ray/X-ray correlation in high-synchrotron peak BL Lacs

Wednesday, December 7, 2016 12:15 PM (20 minutes)

Many multi-wavelength campaigns have been carried out to study high-synchrotron peak BL Lacs (HBL). In particular the activity in the gamma-rays and X-rays seems to be correlated in many observations but, not conclusive results have been achieved yet. In this work we present a robust and comprehensive study of the (VHE) γ-ray/X- ray correlation of Mrk 421 with data taken with different VHE experiments on different time scales and different levels of activity of the source. We show that, independently of the time scale, there exists a robust correlation, consistent between instruments and that can be described as a linear function. However, a breakdown of the correlation is clearly evident at high states of activity with fluxes comparable with three times the one of the Crab at energies above 400 GeV independently of the time scale, observational period or instrument. The breakdown is observed as an arbitrary decrement in the X-ray flux while the source remains in a high state of activity in VHE γ-rays. Even for single flares, the X-ray and VHE γ-ray emissions lie on the correlation until the VHE γ-ray flux reaches values higher than the mentioned above. We present a theoretical interpretation of these results within the leptonic SSC scenario and extend our studies to other HBL.

Author: Dr GONZALEZ, Maria Magdalena (Universidad Nacional Autonoma de Mexico)

Co-authors: Dr PATRICELLI, Barbara (Dipartimento de fisica, Universita di Pisa); Dr GARCIA, Jose Andres (Instituto de Fisica, UNAM); Dr FRAIJA, Nissim (Instituto de Astronomia, UNAM); Dr DICHIARA, Simone (Instituto de Astronomia, UNAM)

Presenter: Dr GONZALEZ, Maria Magdalena (Universidad Nacional Autonoma de Mexico)

Session Classification: Multi-Wavelength Astronomy

Track Classification: HAP Workshop

Contribution ID: **50** Type: **Oral**

Welcome

Wednesday, December 7, 2016 9:00 AM (20 minutes)

Presenter: Prof. BRETZ, Thomas (RWTH Aachen University)

Session Classification: Welcome

Contribution ID: **51** Type: **Oral**

Summary

Friday, December 9, 2016 4:10 PM (20 minutes)

Presenter: Prof. WAGNER, Stefan (LSW)

Session Classification: Summary

Contribution ID: **52** Type: **Oral**

Multimessenger Transients and the Liverpool Telescope

Saturday, December 10, 2016 2:00 PM (20 minutes)

The Liverpool Telescope is a 2-metre clear aperture, fully robotic telescope based at the Observatorio Del Roque De Los Muchachos on the Canary island of La Palma. Robotic telescopes are powerful tools for the exploration of the time variable sky, and their rapid reaction and flexible scheduling capabilities provide them with an important role in the multimessenger era. In this talk I will provide an overview of the telescope and its contribution to programmes of transient follow-up, focusing in particular on our participation in the first Advanced LIGO science run. I will also give a brief introduction to our proposed new facility, the 4-metre Large Robotic Telescope, which we intend to be one of the world's leading time domain facilities in the coming decade.

Author: Dr COPPERWHEAT, Chris (Astrophysics Research Institute, Liverpool John Moores University)

Co-authors: Mr PIASCIK, Andrzej (Liverpool John Moores University); Prof. STEELE, Iain (Liverpool John Moores University)

Presenter: Dr COPPERWHEAT, Chris (Astrophysics Research Institute, Liverpool John Moores University)

Session Classification: AMON Workshop

Track Classification: AMON Workshop

Contribution ID: **53** Type: **Oral**

Blazar Optical Sky Survey - BOSS project (2013-2016) and the long-term optical variability monitoring

Thursday, December 8, 2016 5:10 PM (20 minutes)

Blazar Optical Sky Survey (BOSS) Project is a dedicated observational survey with the aim of monitoring known blazars in optical wavelengths. The project was initiated in March 2013 at the University of Athens Observatory (UOAO), performing ground-based optical photometric observations in parallel with orbital (SWIFT/XRT, FERMI/LAT) X-ray observatories. BOSS project has immediately met international attention, attracting the interest of several collaborators worldwide. It is currently running as an international collaboration of the National University of Athens, utilizing the robotic and remotely controlled telescope at the UOAO. Several targets of interest are monitored in the frame of BOSS Project, such as highly variable blazars and AGNs. The targets are continuously observed on a daily basis, with the aim to achieve dense temporal coverage in optical wavelengths. In parallel, simultaneous observations in high and low energy bands are cross-correlated with BOSS database. In this presentation, the main achievements after the first 4 years of operation of the BOSS Project are given, while the advantage of small, robotic and remotely controlled telescopes is highlighted.

Author: Dr GAZEAS, Kosmas (University of Athens)

Presenter: Dr GAZEAS, Kosmas (University of Athens)

Session Classification: Optical Astronomy

Track Classification: HAP Workshop

Contribution ID: **54** Type: **Oral**

Turbulence Acceleration Model for the Broad Band Blazar Spectra

Thursday, December 8, 2016 2:15 PM (30 minutes)

The curved spectra seen in blazar emission can be explained by the curved electron spectra predicted by the stochastic acceleration process via turbulence. In this slow acceleration process, the time-dependent treatment is essential. In this talk I present our results of the time-dependent simulations of the acceleration and emission in blazars. The model naturally explains the hard and curved spectra. Our results prefer the hard sphere scattering to reconcile the spectral feature. Also taking into account the obtained low magnetic field, the particle scattering is likely due to the compressible waves.

Author: Dr ASANO, Katsuaki (Institute for Cosmic Ray Research, The University of Tokyo)

Co-author: Dr HAYASHIDA, Masaaki (Institute for Cosmic Ray Research, The University of Tokyo)

Presenter: Dr ASANO, Katsuaki (Institute for Cosmic Ray Research, The University of Tokyo)

Session Classification: Modelling

Track Classification: HAP Workshop

Contribution ID: **55** Type: **Oral**

CTA blazar monitoring program and supporting optical monitoring program

Wednesday, December 7, 2016 11:15 AM (30 minutes)

Long term monitoring of blazars is part of the Key Science Programs of the CTA Consortium. In this talk I will describe the foreseen observing program and the supporting optical monitoring observations.

Author: LINDFORS, Elina (Tuorla Observatory, University of Turku)

Presenter: LINDFORS, Elina (Tuorla Observatory, University of Turku)

Session Classification: Multi-Wavelength Astronomy

Track Classification: HAP Workshop

Contribution ID: **56** Type: **Poster**

FAMOUS - a fluorescence telescope using SiPMs

The FAMOUS telescope is a prove-of-concept study for the application of silicon photomultipliers (SiPMs) in fluorescence telescopes. Such telescopes detect the fluorescence light emitted by molecules in the Earth's atmosphere when excited by secondary particles of an extended air shower. Today's instruments are using photomultiplier tubes for photon detection. The 61-pixel FAMOUS camera makes use of the advantages of SiPM sensors, like long-term stability and simple circuitry –resulting in a robust and compact design. The system is built in a 50 cm-diameter aluminium tube with refractive optics driven by a Fresnel-lens. Improvements towards the recent seven-pixel prototype include a more light-weight 50 cm carbon fibre tube, more efficient light concentrators and a more reliable power supply. Robust and attractively priced wide field-of-view telescopes can improve the duty cycle allowing long-run monitoring in the multi-messenger context. First measurements and the status of the 61-pixel telescope will be presented.

Author: SCHUMACHER, Johannes (RWTH Aachen University)

Co-authors: PETERS, Christine (RWTH Aachen University); MIDDENDORF, Lukas (RWTH Aachen University); Prof. BRETZ, Thomas (RWTH Aachen University); Prof. HEBBEKER, Thomas (RWTH Aachen University); Mr NIGGEMANN, Tim (III. Physikalisches Institut A, RWTH Aachen University)

Presenter: SCHUMACHER, Johannes (RWTH Aachen University)

Track Classification: AMON Workshop

Contribution ID: **57** Type: **Oral**

Time Series Analysis For the Multi-Wavelength Future

Thursday, December 8, 2016 9:00 AM (30 minutes)

Virtually all astronomical sources are variable on some time scale, making studies of variability across different wavelengths a major tool in pinning down the underlying physical processes, for example accretion onto compact objects and cataclysmic explosions like gamma-ray bursts. The new telescopes currently starting operations or coming online in the coming years, including the Square Kilometre Array (SKA) and the Cherenkov Telescope Array (CTA), will open up the sky to transient searches, monitoring campaigns and time series studies with an unprecedented coverage and resolution. But at the same time, they collect extraordinarily large data sets of previously unknown complexity, motivating the necessity for new tools and statistical methods. In this talk, I will review the state-of-the-art of astronomical time series analysis, and show possible future directions of research that will help us address the flood of multiwavelength time series data to come.

Author: Dr HUPPENKOTHEN, Daniela (New York University)

Presenter: Dr HUPPENKOTHEN, Daniela (New York University)

Session Classification: Variability Methods

Track Classification: HAP Workshop

Contribution ID: **59** Type: **Oral**

Monitoring the X-ray Sky with Swift Observations of Active Galactic Nuclei and Other Variable Sources

Wednesday, December 7, 2016 11:45 AM (30 minutes)

Due to its ability to rapidly slew, with relatively minimal loss of observing time, Swift is able to look at many targets per day. This efficient pointing, combined with rapid response and the observatory's suite of sensitive telescopes covering multiple wavebands, make Swift an ideal monitoring observatory for the transient and variable sky. Swift regularly monitors a variety of active galactic nuclei (AGN) as part of long-term monitoring campaigns and as part of targeted multi-wavelength campaigns with instruments ranging from radio to TeV gamma-rays. Swift is also observing gamma-ray unassociated sources from the Fermi catalog in an effort to identify X-ray counterparts, which are most likely to be AGN. We will report on the wealth of X-ray data that is available from these programs, while also highlighting some other results on variable X-ray sources.

Author: FALCONE, Abe (Penn State University)

Presenter: FALCONE, Abe (Penn State University)

Session Classification: Multi-Wavelength Astronomy

Track Classification: HAP Workshop

Contribution ID: **60** Type: **Oral**

Multiwaveband Variability of AGN

Thursday, December 8, 2016 11:15 AM (30 minutes)

Most of our understanding of the processes that power AGN has been gained not from single-epoch observations, but from monitoring over long periods and, usually, in more than waveband. In this talk I will describe the results of combined X-ray/UV/optical monitoring of Seyfert galaxies which have shown that UV/optical variability on short timescales is largely driven by reprocessing of high energy. However whether that emission is X-ray emission from the central corona or far-UV emission from the inner edge of the disc is unclear. I will also discuss combined X-ray and radio monitoring of 'radio quiet AGN', ie Seyferts. There is a very weak correlation, indicating that normal Seyferts are probably not the analogues of 'soft state' X-ray binaries but contain low luminosity synchrotron jets. I will also show the results of the more radio-loud LINER galaxies, where rapid, large amplitude, radio variability is seen which is also correlated with the X-ray emission. The perturbations which drive the X-ray variations may also propagate down the jet to drive the radio variability. If time permits I will indicate some similarities with the much more powerful blazars. I will try to suggest a few areas in which future multiband monitoring may be productive.

Presenter: Dr MCHARDY, Ian

Session Classification: Variability Methods

Contribution ID: **62** Type: **Oral**

DWARF Network

Friday, December 9, 2016 9:45 AM (30 minutes)

The variability of the very high energy (VHE) emission from blazars seems to be connected with the feeding and propagation of relativistic jets and with their origin in supermassive black hole binaries. The key to understanding their properties is measuring well-sampled gamma-ray lightcurves, revealing the typical source behavior unbiased by prior knowledge from other wavebands.

Using ground-based gamma-ray observatories with exposures limited by dark-time, a global network of several telescopes is needed to carry out full-time measurements. Obviously, such observations are time-consuming and, therefore, cannot be carried out with the present state of the art instruments.

The FACT telescope on the Canary Island of La Palma is dedicated to monitoring observations. It has been set up, employing a cost-efficient and robotic design. A future aim is the construction of a distributed network of small telescopes. The physical motivation of VHE long-term monitoring will be outlined in detail and the perspective for a network for 24/7 VHE gamma-ray observations will be presented.

Presenter: Dr BACKES, Michael

Session Classification: Gamma-Ray Astronomy

Contribution ID: **63** Type: **Oral**

VLBI observations of high energy sources

Presenter: Prof. KADLER, Matthias

Contribution ID: **64** Type: **Oral**

Time-dependent radiation signatures of relativistic reconnection in blazar jets

Thursday, December 8, 2016 2:45 PM (30 minutes)

Magnetic reconnection is one of the most promising mechanisms of dissipation and particle acceleration in relativistic jets of blazars. Magnetic reconnection is a complex physical phenomenon that by nature is very difficult for analytical and experimental studies. Rapid progress in understanding relativistic reconnection has been made over the past several years thanks to numerical kinetic plasma simulations. Of particular interest to the multiwavelength community of blazar observers is the capability of the kinetic particle-in-cell codes to incorporate the effects of radiation reaction on the energy distribution of particles, as well as to calculate time-dependent radiation signatures (synchrotron and inverse Compton) of particle acceleration in relativistic reconnection. I will discuss the latest simulation results and current limitations on making a direct connection between numerical predictions and observational data.

Author: NALEWAJKO, Krzysztof (Nicolaus Copernicus Astronomical Center)

Presenter: NALEWAJKO, Krzysztof (Nicolaus Copernicus Astronomical Center)

Session Classification: Modelling

Track Classification: HAP Workshop

Contribution ID: **65** Type: **Oral**

Blazar studies with ASTROSAT

Friday, December 9, 2016 2:00 PM (20 minutes)

Blazars are a subclass of Active Galactic Nuclei (AGN) characterized by non-thermal emission extending from radio to high energies. The broadband radiation originates within a relativistic jet that is oriented very close to the line of sight. Radiative processes of Blazars can be studied using ASTROSAT.
ASTROSAT is India's first multi-wavelength astronomy satellite in a 650-km, near-equatorial orbit. ASTROSAT has five onboard payloads for simultaneous multi-band observations at X-ray and UV energies. These instruments cover an energy range from UV to hard X-rays. Detecting accretion disk emission during the low state from the blazar is another goal. I will present some of the possible observational prospects for blazar studies in my talk.

Presenter: Dr SHUKLA, Amit (Institut für Theoretische Physik und Astrophysik, Universität Würzburg)

Session Classification: MWL and Multi-Messenger

Contribution ID: **66** Type: **Poster**

The Second Strong X-Ray Flare in the TeV-detected Blazar 1S 1959+650

The nearby TeV-detected blazar 1ES 1959+650 is one of the bright sources in the X-ray sky and a frequent target of X-ray Telescope onboard the Swift satellite. It has shown two exceptionally two strong and prolonged X-ray flaring activities during the one year period since 2015 August compared to those observed in previous years. During these flares, long lasting X-ray states was superimposed by fast strong flares showing the 0.3-10 keV count rate higher than 20 cts/s many times and making 1ES 1959+650 the third blazar exceeding this level (after Mrk 421 and Mrk 501). The second flare occurred during 2016 June-August and, in average, exhibited higher X-ray state compared to the first one observed during 2015 August - 2016 January, and it often was characterized by very hard spectra with the photon index smaller than 1.70 which is expected in the framework of some hadronic scenarios. During the second flare, the position of the synchrotron SED peak was mostly observed at the energies larger than 2 keV (a rare occasion among blazars), and it was shifted beyond 10 keV since the start of X-ray observations of this source. The spectral curvature was mostly below the value b=0.35, expected in the case of an effective stochastic acceleration of X-ray emitting electrons near the shock front moving downstream the jet, while this mechanism seems to be less effective during the first flare when the curvature parameter generally was significantly larger.

Authors: Dr KAPANADZE, Bidzina (Ilia Sate University, Tbilisi, Georgia); Dr DORNER, Daniela (Universität Würzburg)

Presenter: Dr DORNER, Daniela (Universität Würzburg)

Track Classification: HAP Workshop

Contribution ID: **67** Type: **Poster**

The Multi-Mission Maximum Likelihood framework (3ML)

Astrophysical sources are now observed by many different instruments at different wavelengths, from radio to high-energy gamma-rays, with an unprecedented quality. Putting all these data together to form a coherent view, however, is a very difficult task, for example when performing a broadband fit of the energy spectrum of the source. Each instrument has its own data format, software and analysis procedure, which are difficult to combine. The Multi-Mission Maximum Likelihood framework (3ML) aims to solve this issue, providing a common framework which allows for a coherent modeling of sources using all the available data, independent of their origin. At the same time, thanks to its architecture based on plug-ins, 3ML uses the existing official software of each instrument for the corresponding data in a way which is transparent to the user. 3ML is based on the likelihood formalism, in which a model summarizing our knowledge about a particular region of the sky is convolved with the instrument response and compared to the corresponding data. The user can choose between a frequentist analysis, and a Bayesian analysis. Our implementation of these ideas is very flexible, allowing the study of point sources as well as extended sources with arbitrary spectra. We will review the problem we aim to solve, the 3ML concepts and its innovative potential.

Authors: Dr VIANELLO, Giacomo (Stanford University); Dr LAUER, Robert (University of New Mexico)

Co-authors: ALBERT, A (LANL); RHO, C (U. of Rochester); AYALA, H (MTU); ZHOU, H (LANL); BURGESS, J M (KTH); HARDING, J P (LANL); TIBALDO, Luigi (KIPAC/SLAC); HUI, Michelle (NASA/MSFC); OMODEI, N (Stanford U.); YOUNK, P (LANL); BENZVI, Segev (U. of Rochester)

Presenter: Dr LAUER, Robert (University of New Mexico)

Contribution ID: **68** Type: **Poster**

M@TE - Monitoring at TeV Energies

Blazars are extremely variable objects emitting radiation across the electromagnetic spectrum and showing variability on
time scales from minutes to years. For the understanding of the emission mechanisms, simultaneous multi-wavelength observations
are crucial. Various models for flares predict simultaneous flux increases in the X-ray and in the gamma-ray band or more complex
variability patterns, depending on the dominant process responsible for the gamma-ray emission. Monitoring at TeV energies is
providing important information to distinguish between different emission mechanisms.
To study the duty cycle and the variability time scales of the object, an unbiased data sample is essential, and a good sensitivity
and continuous monitoring are needed to resolve variability on smaller time scales.
A dedicated long-term monitoring program at TeV energies has been started by the FACT project more than four years ago.
The success of the project clearly illustrated that the usage of silicon based photo sensors (SIPMs) is ideally suited for long-term
monitoring. They provide not only an excellent and stable detector performance, but also allow for observations during bright
ambient light like full moon minimizing observational gaps and increasing the duty cycle of the instrument. The observation time
in a single longitude is limited to six hours. To study typical variability time scales of few hours to one day, the ultimate goal is
24/7 monitoring with a network of small telescopes around the globe (DWARF project).
The installation of an Imaging Air Cherenkov Telescope is planned at the site 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
camera using the new generation of SiPMs. In the presentation, the status of the M@TE project will be reported and the scientific
potential, including the possibility to extend monitoring campaigns to 12 hours by coordinated observations together with FACT,
will be outlined.

Authors: Dr DORNER, Daniela (Universität Würzburg); Dr TOVMASSIAN, Gagik (Instituto de Astronomia, UNAM); Dr GONZALEZ, Maria Magdalena (Universidad Nacional Autonoma de Mexico); Dr ALFARO, Ruben (Instituto de Fisica, UNAM); Dr DICHIARA, Simone (Instituto de Astronomia, UNAM); Prof. BRETZ, Thomas (RWTH Aachen University)

Presenter: Dr GONZALEZ, Maria Magdalena (Universidad Nacional Autonoma de Mexico)

Contribution ID: **69** Type: **not specified**

Closing

Friday, December 9, 2016 4:30 PM (10 minutes)

Presenter: Prof. BRETZ, Thomas (RWTH Aachen University)

Session Classification: Summary

Contribution ID: **70** Type: **not specified**

”Multimessenger studies with HAWC”

Saturday, December 10, 2016 11:10 AM (20 minutes)

Presenter: Dr LAUER, Robert (University of New Mexico)

Session Classification: AMON Workshop

Contribution ID: **71** Type: **not specified**

”Status of the AMON network”

Saturday, December 10, 2016 9:25 AM (30 minutes)

Presenter: TEŠIĆ, Gordana (Penn State University)

Session Classification: AMON Workshop

Contribution ID: **72** Type: **not specified**

”IceCube multimessenger program”

Saturday, December 10, 2016 9:55 AM (20 minutes)

Presenter: KINTSCHER, Thomas (DESY)

Session Classification: AMON Workshop

Contribution ID: **73** Type: **not specified**

"The Auger contribution to AMON"

Saturday, December 10, 2016 10:15 AM (20 minutes)

Presenter: Dr OIKONOMOU, Foteini (Penn State)

Session Classification: AMON Workshop

Contribution ID: **74** Type: **not specified**

”Multimessenger follow-up with FACT”

Saturday, December 10, 2016 11:30 AM (20 minutes)

Presenter: Dr DORNER, Daniela (Universität Würzburg)

Session Classification: AMON Workshop

Contribution ID: **75** Type: **not specified**

”Multimessenger Follow-up with MAGIC”

Saturday, December 10, 2016 12:10 PM (20 minutes)

Presenter: SATALECKA, Konstancja (DESY Zeuthen)

Session Classification: AMON Workshop

Contribution ID: **76** Type: **not specified**

”Multimessenger Follow-up with MASTER”

Saturday, December 10, 2016 2:20 PM (20 minutes)

Presenter: Prof. LIPUNOV, Vladimir (Lomonosov Moscow State University)

Session Classification: AMON Workshop

Contribution ID: **77** Type: **not specified**

”LOFAR/AERA”

Saturday, December 10, 2016 2:40 PM (20 minutes)

Presenter: HÖRANDEL, Jörg (Radboud University Nijmegen)

Session Classification: AMON Workshop

Contribution ID: **78** Type: **not specified**

”Welcome”

Saturday, December 10, 2016 9:00 AM (5 minutes)

Presenter: Dr KEIVANI, Azadeh (The Pennsylvania State University)

Session Classification: AMON Workshop

Contribution ID: **79** Type: **not specified**

VLBI monitoring and Dynamic SEDs of southern blazars

Friday, December 9, 2016 11:20 AM (30 minutes)

Presenter: Dr KRAUSS, Felicia (GRAPPA & API, UvA)

Session Classification: Radio Astronomy