IBWS 2016
BOOK OF ABSTRACTS

13th INTEGRAL/BART Workshop

IBWS 2016 is 13th in the series of successful workshops dedicated to high energy astrophysics and supporting ground-based experiments (e.g. robotic telescopes)

The workshop includes Small satellite day with the objective to bring together scientific experimenters and payload providers with the small satellite designers and realizers. There is a BRITE (small astronomical satellites) session, JEUMICO (Bavarian-Czech collaboration in X ray optics) session, and session on high-energy variability observations.

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Czech Technical University in Prague
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Rene Hudec: IBWS Introduction and Historical Background

IBWS Introduction and Historical Background will be given

Vladimír Dániel: VZLUSAT-1 CubeSat demonstration

VZLUSAT-1 is a Czech 2U CubeSat type technological nanosatellites for the in-orbit demonstration of new technologies and products in Earth orbit. Demonstration of the Engineering Model (EM) of the VZLUSAT-1 will be presented. The demonstrator is assembled from the EM of the OBC, Miniaturized X-ray telescope with deployable optics and In-orbit demonstrator of Radiation hardened composite housing material (RHCH). The presentation will be done in the form of workshop including the real-time operation via umbilical connector and also the using the ground segment SW. Presentation also shows the details of observation modes, details about detectors, data processing and handling system and mission details. The presented Miniaturized X-ray telescope instrument is suitable for the astrophysical, Sun, moon, terrestrial gamma flash observation or radiation background monitoring. The In-orbit demonstrator of the RHCH is suitable for shielding the space radiation of the satellites, manned spacecrafts or habitats for the moon or mars. The CubeSat launch is planned to summer 2016 to 460km LEO.

Ivo Veřtát: Pilsen Ground Station for VZLUSat-1

A talk about the ground control station of VZLUSat-1 for satellite commanding and operating. During the talk the web application for satellite operators will be presented as well as automatization of radio transmission and data handling.

Matus Kocka: SkCube, the VLF experiment and the ionosphere study not only by future SID network

SkCube is first Slovak satellite which will launch on board Falcon 9 in the beginning of the summer 2016. The satellite is 1U cubesat with unique design and experiments. The main scientific payload is VLF receiver able to operate in two readout modes. The goal is to study upper ionosphere environment, earth magnetosphere and strong lightnings. As the related project to our study of the ionosphere is proposal to build autonomous SID (sudden ionospheric disturbance) monitor network. The receivers in such network will be similar to the one in SkCube, network will be autonomous, low energy and maintenance-free with ability to use data from other already existing SID detectors. We took into account lessons learned from previous SID monitor initiatives in both Slovakia and Czech Republic.

Schilling Klaus: Earth Observation by Small Satellite Formations

Coordinated observations by telescopes from several small satellites by photogrammetric methods enable 3D-images of the Earthś surface at interesting resolution. The application potential of such sensor networks formed by small satellite formations for other phenomena will be addressed.

Joern Wilms: Transition Edge Sensors

I will present a review of the physics of Transition Edge Sensors, using the example of the X-IFU instrument on Europeś future X-ray mission ATHENA. TES are cryogenic detectors operated at a few tens milli Kelvin. They have an energy resolution of a few eV, i.e., roughly comparable to X-ray gratings, and imaging capabilities, allowing the instruments to be used as integral field spectrometers.

Vojtěch Laitl: Phenomena in D Ionospheric Layer

The problem of electron density's distribution in ionosphere has recently been questioned. However, the current models do not attempt to describe the D ionospheric layer, even though this area can be easily monitored by the signals of very low frequencies. In this lecture, I will show our model focused on the D-layer and its electron density. I will also discuss our results with experimental measurement and talk about other phenomena for whose investigation our model can be used, for example the behaviour of partially ionized gas which leads to formation of a low-temperature plasma. Ionization mechanism of some simple molecules, such as nitrogen's oxides, can be shown by the approach of the Arrhenius equation. In accordance with our knowledge about the plasma's aspects, we are able to model the breakdown of these simple molecules into free radicals and compute their spectral wavelength's decay.

Vojtěch Fárek: Observing the Sun and Jupiter by the HF's

The problematic of solar flares, corona mass eruptions and not at last Jupiter's energy interactions belong to one of the most-questioned topics within the research of our Solar System. Jupiter is the planet which spreads the biggest number of energy from all the planets in the Solar System, even more then it gets from the Sun. A lot of that energy is produced by a slow contraction of this planet and also by loads of chemical reactions. However, the interactions with Galilean moons, first of all Io, cannot be missed out. Actually, it is the main source of energy being spread into large space. The Earth can also be hit by this energy and its atmosphere can be affected. In this lecture, I will focus on modelling of Jupiter's interactions in three important Io phases, called Io-Storm phases. The Sun and Jupiter can both be easily monitored by radio telescopes within high frequencies so I will also show how to make the measurement and I will comment the results.

Martin Urban: Volatiles payload on VZLUSAT-1 and thermal cycling in vacuum chamber

This talk is about before-flight tests on VZLUSAT-1 CubeSat satellite, which will be launched during summer 2016. Full function tests of the payload carrying several different sensors for measuring of humidity. Measuring in thermovacuum chamber during thermal cycling, according to QB50 mission requirements.

Ondrej Nentvich: Health monitor system on VZLUSAT1

Health monitoring system on VZLUSAT 1 tests aging of carbon-fibre material in space on LEO orbit. This talk is about this payload and its before-flight tests of this system using two different sensing methods of signal and comparing results between them.

Veronika Stehlikova: Radiation resistance measurement on VZLUSat-1

The Measure payload on VZLUSat-1, which ought to be launched in summer 2016, will measure radiation environment in orbit. This payload will test a new shielding material with better radiation resistance as well. All before-flight tests were already performed and their results will be mentioned also in this article.

Rene Hudec: UV LDS Camera as Picosatellite Payload

The small UV low dispersive cameras for LDS star spectroscopy were used with Prof Karl Henize as PI in several US manned space missions (Gemini flights and Skylab). I will show and discuss obtained results along with suggestion of upgraded UV LDS camera as a scientific payload for a picosatellite such as BRITE.

Vladimir Daniel: BRITE CZ: Extending BRITE to X and UV

We will give short overview of proposal submitted recently in the Czech Republic of funding of development and launch of Czech BRITE satellite, focussing on monitoring of X ray and UV sources.

Andrzej Pigulski: Science with the BRITE photometry

The BRITE nano-satellites provide long-term photometry for the brightest stars in the sky. I will present an overview of the first scientific results achieved with the BRITE photometry focusing on hot pulsating stars and eclipsing binaries.

Rainer Kuschnig: BRITE-Constellation - Nanosatellites for Astrophysics

BRITE-Constellation consists of six 20cm cube satellites with a mass of about 7 kg each. Three countries Austria, Canada and Poland funded pairs of those spacecrafts with a small (3cm) aperture telescope/CCD camera instrument, one sensitive in blue and one in a red bandpass. They were launch in sequence starting February 2013. The goal is to measure the brightness variations of the brightest stars in the sky (< 4 mag(V)) with high precision over a time span of up to 6 month. An overview of the technical design of the satellites will be given as well as a status report and highlights of experiences with operating a fleet of nanosatellites during the pas

Adolf Inneman: X-ray monitoring for astrophysical applications on Cubesat

L. Pina, R. Hudec, A. Inneman, D. Cerna, V. Marsikova, J. Jakubek, L. Sieger, T. Baca, V. Stehlikova V. Dániel, W. Cash, R. L. McEntaffer, T. B. Schultz

The primary objective of the project VZLUSAT-1 is the development, manufacturing, qualification and experimental verification of products and technologies in Earth orbit (IOD – In-Orbit Demonstration). This work addresses the issue of X-ray monitoring for astrophysical applications. The proposed wide-field optical system has not been used in space yet. The proposed novel approach is based on the use of 1D "Lobster eye" optics in combination with Timepix X-ray detector in the energy range 3 - 40 keV. The proposed project includes theoretical study and a functional sample of the Timepix X-ray detector with multifoil wide-field X-ray "Lobster eye" optics. Using optics to focus X-rays on a detector is the only solution in cases the intensity of impinging X-ray radiation is below the sensitivity of the detector, e.g. while monitoring astrophysical objects in space, or phenomena in the Earth's atmosphere. On board the functions and features of Radiation Hardened Composite Housing (RHCH), Solar panels based on composite substrate and Hollow Retro Reflector Array based on composite (HRRA) will be verified. To verify the properties of the developed products the satellite is equipped by Health Monitoring system (HM). HM system includes temperature, volatiles, radiation and mechanical properties sensors. The custom ADCS algorithms are being developed within the project. Given the number of IOD experiments and the necessary power the 1U CubeSat is equipped with Composite Deployable Panels (CDP) where HM panels and additional Solar panels are located. Satellite platform is assembled from commercial parts. Mission VZLUSAT-1 is planned for 6 months with launch in 2016.

Elzbieta Zoclonska: Epsilon Centauri and Epsilon Persei observed by space telescopes BRITE

Analyses of observations of two Beta Cephei stars carried out with small space telescopes of BRITE-Constellation are presented. Eps Centauri and Eps Persei are bright, massive stars with low-amplitude pulsations in visible light. Thanks to precision photometry from BRITE, the determination of multiple pulsation frequencies was possible. Additional ground-based spectroscopic observation were done for Eps Persei. The combination of both space photometry and ground-based spectroscopy led to determination of further properties of the pulsating star and the multi-object system of with this star is the primary member.

Maria D. Caballero-Garcia: Implementing an X-ray reverberation model in XSPEC

X-ray reverberation mapping has been revealed to be a valuable tool for knowing the physical condition of the accreting black holes and the matter that surrounds them. This is an important case of interest for the exploitation of the data from the next generation of big X-ray satellites (e.g. Athena, Astro-H). Here we present a new theoretical model recently created at Prague, that has been developed for the study of X-ray astronomical data, aimed for its use in both timing and spectroscopy techniques.

Robert Filgas: GRB 111209A / SN 2011kl: a very luminous supernova related to an ultra-long GRB

A new class of ultra-long-duration γ-ray bursts has recently been suggested. They may originate in the explosion of stars with much larger radii than those producing normal long-duration γ-ray bursts or in the tidal disruption of a star. No clear supernova has yet been associated with an ultra-long-duration γ-ray burst. Here we report that a supernova (SN 2011kl) was associated with the ultra-long-duration γ-ray burst GRB 111209A, at a redshift z of 0.677. This supernova is more than three times more luminous than type Ic supernovae associated with long-duration γ-ray bursts and its spectrum is distinctly different. The slope of the continuum resembles those of super-luminous supernovae but extends further down into the rest-frame ultraviolet implying a low metal content. The light curve evolves much more rapidly than those of super-luminous supernovae. This combination of high luminosity and low metal-line opacity cannot be reconciled with typical type Ic supernovae, but can be reproduced by a model where extra energy is injected by a strongly magnetized neutron star (a magnetar), which has also been proposed as the explanation for super-luminous supernovae. This work has been published in Nature.

Vojtech Simon: X-ray monitoring of cataclysmic variables

We will show that the available X-ray monitors can detect cataclysmic variables (CVs) which contain magnetized white dwarfs. This suggests that the mode of accretion is very important for the detection. The reason is that only a radial flow onto the accretion region on the magnetized white dwarf causes sufficiently hard X-ray spectrum to be observable by the current monitors. Monitoring the X-ray emission is important for observing the activity of such sources on long timescales (months, years). We will also show the possible ways of studying the faint X-ray CV emitters using these data.

Daniela Dorner: Flaring Activity of 1ES 1959+650 at High Energies

In autumn 2015, the high frequency peaked BL Lac type object 1ES 1959+650 showed enhanced flux both in the X-ray and gamma-ray regime. The source was observed regularly with the X-ray Telescope onboard of the Swift satellite from August 2015 till January 2016. From the long-term monitoring of the First G-APD Cherenkov Telescope (FACT), more than 150 hours of observations are available in that time range. These data were analyzed in the multi-wavelength (MWL) context together with the Fermi data. In X-rays, a new highest historical count rate was measured. While simultaneous flaring activity is found in the optical and gamma-rays, there is also one flare in the gamma-ray regime without significant counterpart in the low energy peak of the spectral energy distribution. In the presentation, results from the MWL analysis will be discussed.

Robert Filgas: Dark matter search results from PICO-2L and PICO-60 bubble chambers

We report new data from 3 papers published last year from the operation of our 2 dark matter detectors located at SNOLAB, Canada. A 2-liter PICO-2L C3F8 bubble chamber and PICO-60, the largest bubble chamber to search for dark matter to date. These data provide the most sensitive direct detection constraints on WIMP-proton spin-dependent scattering to date, with significant sensitivity at low WIMP masses for spin-independent WIMP-nucleon scattering.

Christina Graefe: Centaurus A

Active galactic nuclei (AGN) are among the most energetic objects in the universe, and have been extensively studied over decades. Most AGN can be studied in moderate spatial resolution only, because of the great distance to the objects. Being one of the closest AGN, Centaurus A has been observed by instruments covering all wavelengths. Despite these efforts, many open questions remain. Centaurus A is part of the TANAMI sample of southern radio-loud AGN studied by us with VLBI monitoring observations. Using also data from the X-ray satellites Chandra, XMM and Suzaku, we study its emission features to resolve both spatial and energetic features, and work on putting them in the context of AGN.

Marco Fink: Black Hole Spin Measurements in Lamp Post Geometry

M. Fink, T. Dauser, T. Beuchert, S. Jeffreson, J. Tawabutr, J. Wilms, J. Garcia, D. Walton

We analyze a sample of bare AGN spectra based on the sample introduced by Walton et al. (2012) using high signal-to-noise spectra from the XMM and NuStar archives. We model features of blurred reflection off an ionized accretion disk using the angle resolved RELXILL code, describing the irradiation of the disk in the lamp post geometry. By combining this advanced reflection model with Suzaku and joint XMM and NuSTAR observations, both outstanding in signal-to-noise and spectral coverage, we can put tight constraints on the spin parameter and we are able to constrain the height of the primary photon source in the lamp post geometry.

Paul Ray Burd: Long-Wavelength Radio Observations of Blazars

Active Galactic Nuclei (AGN) form plasma jets by accretion of material onto a central supermassive black hole in the center of the galaxy. The particles in the jets are accelerated to highly relativistic energies and bulk-relativistic plasma velocities are evident from the observation of apparent superluminal motion on parsec scales if the jet-inclination angles are small. Such AGN are referred to as blazars and are subdivided into BL Lac objects and flat spectrum radio quasars (FSRQs). The jets typically form lobes on kiloparsec scales, which are prominent in radio galaxies, which are considered to be the unbeamed counterparts of blazars. The unification paradigm of AGN suggests that FSQRs and BL Lacs are the counterparts of FR1 and FR2 radio galaxies at low inclination angles and therefore at low radio frequencies the lobe emission should dominate the beamed flat-spectrum nuclear emission. There are many indications that this is a too simplified picture. We observe a sample of high-frequency selected beamed blazar jet sources from the MOJAVE sample at low radio frequencies with LOFAR at 120-160 MHz and with the Giant Metrewave Radio Telescope (GMRT) at 610 MHz and compare their long-wavelength properties to higher-frequency radio data.

Doehring Thorsten: Project JEUMICO – Bavarian-Czech Cooperation on the development of X-ray mirrors

In 2015 a joint call of the Bavarian State Ministry of Education, Science and the Arts and the Ministry of Education, Youth and Sports of the Czech Republic for joint projects was published. The intention of this call was to enhance scientific cooperation between the Czech Republic and Bavaria. Scientists from Aschaffenburg University of Applied Sciences and from the Czech Technical University in Prague submitted a joint proposal for a bilateral project. The aim of the project JEUMICO, an abbreviation for "Joint European Mirror Competence", is the effective combination of experience, expertise and instrumentation of the Bavarian and the Czech partner in design, development, manufacturing, simulation and testing of innovative X-ray mirrors by the application of thin films and nanotechnology. Within this field the partners have valuable and complementary experience. Funding was granted in early 2016 and the project was recently started officially with a kick-off meeting in Prague.

Anne-Catherine Probst: Development of thin film Iridium coatings for astronomical X-ray mirrors

To fulfill the stringent mass requirements of new generations of space-based observatories with large collecting area for investigations of astronomical X-rays sources, we consider a mirror technology based on thin coated glass sheets. For this purpose, glass substrates are formed by thermal treatment into precise Wolter I shape, whereas the coating has to provide high reflectivity for low energy X-rays. To provide best performance of the X-rays mirrors, low surface roughness is required on the coated slumped glasses. Process development for slumped glasses and the coating of thin Iridium films are the focus of the INTRAAST project (Industry transfer of astronomical mirror technologies), a cooperation of the Aschaffenburg University of Applied Science (Germany) and the Max-Planck-Institute for Extraterrestrial Physics (Germany). In this project thin film deposition of Iridium on thin glass substrates occurs in a PVD-sputtering process. Dependencies of the properties of the thin Iridium films such as coating stress and crystal structure on the deposition parameters will be discussed.

Michael Kreter: Blazars as Potential High-Energy Neutrino Sources

Jets from Active Galactic Nuclei (AGN) are among the best candidates for the recently detected extraterrestrial neutrino flux. Specifically, gamma-ray blazars have been predicted to yield a cumulative neutrino signal exceeding the atmospheric background above energies of 100 TeV, assuming that both the neutrinos and the gamma-ray photons are produced by accelerated protons in relativistic jets. Since the background spectrum falls steeply with increasing energy, the individual events with the clearest signature of being of an extraterrestrial origin are those at the highest energies. Hadronic AGN jet emission models predict a tight correlation between the neutrino flux and the time-variable gamma-ray emission. We develop a strategy to search for high-energy neutrinos from promising blazar jets from the TANAMI sample using the ANTARES telescope, Fermi gamma-ray light curves, and time- resolved multiwavelength SED data. An unbinned maximum-likelihood method is applied to maximize the probability of a neutrino detection with ANTARES or alternatively constrain the possible neutrino spectra for candidate associations with IceCube neutrino events.

Felicia Krauß: Bert, Ernie, and Big Bird: Blazars as possible sources of IceCube PeV neutrinos

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 expected number of neutrinos assuming a pion photoproduction model. We find a blazar outburst in positional and temporal agreement with the highest-energy neutrino event, whose PeV neutrino flux is high enough to explain the observed event. Further, we use the TANAMI sample to search for hadronic signatures in the broadband spectrum and to study the spectral evolution during blazar outbursts.

Daniela Dorner: FACT - Result from More than Four Years of Monitoring

Since October 2011, the First G-APD Cherenkov Telescope (FACT) has been observing at TeV energies. The major goal of the project is the long-term monitoring of bright TeV blazars. In the last 4.5 years, more than 6200 hours of physics data have been collected. Using a camera with silicon based photosensors (SiPMs, aka G-APDs), observations during bright ambient light are carried out regularly without degradation of the sensors. Like this observational gaps are closed providing a denser and more regular data sample and enlarging the duty cycle of the instrument. Keeping the gain of the SiPMs stable with an online feedback system, a stable and homogeneous detector performance is achieved. Based on this and an automatic data taking procedure, the duty cycle of the instrument is increased further. An unbiased long-term data sample is achieved by an observing strategy to monitor a small sample of sources as much and as regularly as possible. An automatic quick look analysis provides results shortly after the data are taken allowing to send flare alerts within the same night. This allows for coordinated Target-of-Opportunity (ToO) observations and multi-wavelength (MWL) observations of interesting events. Blazars are extremely variable objects emitting radiation across the electromagnetic spectrum. For the understanding of the emission mechanisms, simultaneous MWL bservations are crucial. Observations at very high energies are important to distinguish between different emission models. Therefore, FACT is an ideal instrument for studying TeV blazars in the MWL context. Being bright at TeV energies, the blazars Mrk 421 and Mrk 501 are the main targets for FACT. They are monitored since January 2012 for a total of more than 1200 hours each and showed several flaring activities during that time. In addition, several other sources like for example the Crab Nebula, 1ES 1959+650 and 1ES 2344+54.1 are observed regularly. 1ES 1959+650 showed an enhanced flux in autumn 2015 when also bright outbursts at X-ray energies were measured with Swift. Mrk 501 underwent major outbursts in June 2012 and June 2014 during the yearly MWL campaigns. Mrk

421 showed a bright flare in April 2013 during which also a large MWL data sample is available. In December 2015, a smaller flare was registered, and within a ToO program, Integral and Swift observations were triggered to study the spectral energy distributions. In this presentation, the results from more than four years of monitoring will be summarized and discussed in the MWL context.

Alexander Kappes: The Extended Radio Structure of High-z Blazars

Extragalactic radio-loud quasars have relativistic jets feeding the associated radio-lobes. These are observed in radio-galaxies, as well as in sources whose jet is aligned with the line of sight, i.e. blazars. The very existence of a dozen high-z blazars suggests that a much larger population of misaligned jetted AGNs must exist at z¿4. Yet, such parent population proved to be very elusive and escaped detection in radio surveys so far. Similarly, extended radio emission of high-z blazars has not yet been detected. Both these results could be understood if synchrotron emission from the lobes of such objects is quenched by Compton scattering off the CMB. We use high-resolution long-wavelength LOFAR observations to search for extended emission in a sample of blazars with redshifts z¿4. The results will yield improved angular resolution and sensitivity to faint extended optically-thin lobe structures in high-z blazars and test the CMB-quenching scenario.

Daniela Dorner: 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. Observations at very high energies are important to distinguish between different emission models. Furthermore, an unbiased data sample is needed to study the duty cycle of the objects. 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 nicely showed that the usage of silicon based photo sensors (SiPMs) is ideally suited for long-term monitoring, as they provide not only an excellent and stable detector performance, but also allow for observations during bright ambient light like full moon. This allows to increase the duty cycle of the instrument and close observational gaps. Due to the rotation of the Earth, the observation time in one site is limited to six hours. This makes it difficult to study typical variability time scales of few hours to one day. Therefore, 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.

Rene Hudec: SMILE project and Czech participation

SMILE was selected within ESA China call and represents satellite to study Earth magnetosphere by X rya and UV experiments. The project will be briefly presentd togeether with expected Czech participation.

Petr Suchánek: Tester for SMILE instrument SXI

A short talk based on current knowledge of the SXI instrument and several aspects on how testing of the instrument can be performed.

Volker Perdelwitz: Simultaneous observations with TIGRE and X-ray facilities

The Telescopio Internacional de Guanajuato Robótico-Espectroscópico, a 1.2m spectroscopic telescope located in the Mexican highlands and operated by the universities of Hamburg, Guanajuato and Liège (TIGRE), has been in fully robotic operation since 2013. Designed for the study of stellar activity, it is being used frequently for simultaneous/quasi-simultaneous observations with X-ray facilities such as XMM-Newton and Chandra. In this talk we present results of some of these projects as well as an outlook on future ones, e.g. pointings accompanying the eROSITA survey.

Martin Jelinek: EMCCD Based Cameras in Astronomy

Electron Multilying CCD devices were developped to overcome certain disadvantages of CCDs - the readout noise, and the slow readout. I will talk about their use in astronomy.

Jan Štrobl: BART & D50: the new era

We would like to shortly announce recent significant advances, concerning robotic telescopes BART and D50 in Ondrejov Observatory.

Petr Kubánek: RTS2 - upgrades and updates

Review of RTS2 new features (TLEs, MPEC, own telescope error modeling). New telescopes and observatories using RTS2. Posters

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Carlos Granja: On-site calibration of spacecraft gamma-ray spectrometer for the BepiColombo ESA/JAXA mission to Mercury by transportable gamma-ray station

A compact and transportable gamma-ray source station has been built to provide a discrete gamma-ray field in wide energy range (100 keV – 9 MeV). The station is designed for spacecraft payload qualification and preflight calibration of space radiation sensors on site at Test Centers of space agencies or large scale integrators. The gamma-ray field produced in the station, characterized by conventional HPGe detector, was first used in Prague to calibrate a flight-qualified instrument equipped with a LaBr3:Ce scintillation detector delivered by ESA. Results include gamma-ray spectra acquired in wide-energy range by both detectors. Typical measuring times for calibration of flight-version devices are between 2 to 10 min (up to 6.2 MeV) and 20 to 30 min (up to 8 MeV) with the detector placed at a distance 2 to 5 m from the station. In 2015 the station was shipped to the Russian space institute IKI in Moscow for testing and calibration of the Mercury Gamma-Ray and Neutron Spectrometer (MGNS) payload to be flown on board the Mercury Polar Orbiter (MPO) part of the ESA's BepiColombo mission to Mercury in 2018. Results are presented of measurements performed on the MGNS gamma-ray spectrometer equipped CeBr3 and LaBr3 detectors.

Carlos Granja: Mapping of space radiation in LEO orbit by the SATRAM/Timepix payload on board the ESA Proba-V satellite

Detailed spatial- and time-correlated maps of the space radiation environment in Low Earth Orbit (LEO) are produced by the spacecraft payload SATRAM operating in open space on board the Proba-V satellite from ESA. Equipped with the hybrid semiconductor pixel detector Timepix, the compact radiation monitor payload provides the composition and spectral characterization of the mixed radiation field with quantum imaging sensitivity, single-particle counting, energetic charged particle directional tracking and dE/dx response in wide dynamic range in terms of particle type fluxes and dose rates. With a polar orbit (sun synchronous, 98° inclination) at the altitude of 820 km the payload samples the space radiation field at LEO covering the whole planet. Extensive results of long-period data evaluation in the form of time-and spatially-correlated maps of total dose rate (charged particles, X-rays) are presented including comparison between quiescent and geomagnetic storm/active periods induced by solar particle events (SPEs).

Petr Skala: Measurement of KV and Sonnenberg wide cameras

Gama ray burts are quick and dynamic objects, and observation with big telescopes require fast response and a bit of luck. Many observatories use all sky monitors wich takes images all night and can be able to detect GRB.

Tobias Hain: Gamma-ray-burst afterglow observations with eROSITA

T. Hain, T. Dauser, A. Berberich, J. Wilms (ECAP and Remeis-Observatory)

eROSITA is a X-ray telescope in the energy band between 2 and 10eV which will be launched as part of the Spectrum Roentgen-Gamma mission in 2017 fall. eROSITA will perform a four year long X-ray all-sky survey by rotating around its axis in four hours. This observation strategy provides useful data for the analysis of transient objects. We estimate the detection rate of gamma-ray-burst afterglows, using simulations of the eROSITA all-sky survey with the simulator SIXTE. Using a sample of Swift lightcurves, we study the detection probabilities for these objects based on a bayesian block analysis of the instrumentś data stream.

Rene Hudec: Lobster Eye Astronomical X Ray Monitors

Lobster Eye Astronomical X Ray Monitors can be used as advanceed scientific payloads for pico and even cubesatellites. Some details will be presented and discussed.

Ronald Langer: Cosmic rays and thunderstorms at Lomnický štít.

Since March 2014 at Lomnický štít is operating the muon detector SEVAN in the continuous mode. Its measurements complement the long term detection of cosmic rays (CR) by neutron monitor. In presentation we review the existing profiles of measurements in several channels of SEVAN, that have different response to different types and energies of secondary CR particles at altitude 2634 m asl. We discuss a couple of events during 2014 and 2015 when short term increases of count rate by SEVAN have been observed around the time intervals of thunderstorm activity in the vicinity of Lomnický štít. Brief review of current status in research of so called thunderstorm ground enhancements (TGE) and of their possible relations to terrestrial gamma ray flashes (TGF) studied nowadays on satellites is done. One such event we reported earlier in the region of the magnetosphere geomagnetically conjugated with the site of strong thunderstorm activity on satellite CORONAS-F [1]. The work is supported by VEGA grant No 2/0026/16. [1] R. Bučík, K. Kudela, and S. N. Kuznetsov, Satellite observations of lightning-induced hard X-ray flux enhancements in the conjugate region, Ann. Geophys., 24, 1969-1976, doi:10.5194/angeo-24-1969-2006, 2006

Michal Platkevic: Miniaturized X-ray telescope for VZLUSAT-1

Presented Miniaturized X-ray telescope instrument is based on 1D Lobser eye optics and hybrid silicon pixel detector Timepix (256 x 256 pixels with pitch of 55 μm). Aim of this payload on the VZLUSAT-1 CubeSat is localization of different X-ray radiation sources.

Kateřina Remišová: Vision in the Deep Sea: Mirror Eyes

Doehring Thorsten: Competing proposals for satellite components - a case study for engineering students

Future sales engineers are educated within the bachelor degree program "International Technical Sales Management" at Aschaffenburg University of Applied Sciences. Based on skills acquired in previous semesters, the interactive lecture "project study" is given in their second year. As a case study the students have to prepare voluminous proposals for satellite components in competing teams. Thereby the complete set of original ESA tender documents including norms and standards is shocking them at first. Work sharing and teamwork reduces the effort. At the end of the semester the students acknowledge the learning effect at and the resulting proposals are already quite professional. It is the aim of this course to confront students with such sometimes painful exercise at university and under guidance of a professor with corresponding industrial experience - before they get shocked and overburdened in their first sales job by an extensive sales proposal.

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