BOOK of ABSTRACTS

11th INTEGRAL/BART Workshop

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The X-ray spectral and timing behaviour of the accreting pulsar V0332+53

Maria D. Caballero-Garcia

INAF-OAB

The X-ray emission from accreting stellar-mass black holes in LMXBs has been studied for many decades. This is due to the length of their X-ray outbursts, which have allowed intensive observing campaigns using data from satellites such as XMM-Newton, Chandra, SWIFT, RXTE, Suzaku, INTEGRAL, etc. In the case of HMXBs, and in particular for accreting X-ray pulsars, their X-ray emission is far from being understood. This is due to their short episodes of X-ray emission and complex physical properties, including strong magnetic fields. In this talk we present some preliminar results from the analysis of the recent outbursts from the Be X-ray pulsar V0332+53.

Initial follow-up of optical transients using BOOTES

Maria D. Caballero-Garcia

INAF-OAB

Currently astronomy is having a precious time (in spite of the critical economical situation) for many reasons. One of them is because the continuous observing campaigns of the sky by telescopes that invert most of their time in the discovery and classification of new sources. This has led to important discoveries led by the astrophysical community in the recent years. BOOTES (Castro-Tirado et al.) is a web of 50-60 cm robotic telescopes distributed around the world and has been developed during the last years. This distribution is unique and allows observing campaigns of a source located anywhere in the sky. We will show that one of the goals is to observe and provide source classification of new (or poorly studied) optical transients.

Long-term Monitoring of Bright TeV Blazars with FACT

Daniela Dorner

Universität Würzburg

The First G-APD Cherenkov Telescope (FACT) is operational since October 2011. Since then, more than 4300 hours of data have been recorded. The major goals of the project are the proof of principle for silicon based photosensors, aka Geiger-Mode Avalanche Photodiodes (G-APDs), in Cherenkov Astronomy and the monitoring of bright TeV blazars.

The stable and homogeneous properties of the G-APDs provide a stable and consistent performance of the detector showing that G-APDs are a promising alternative as photosensors in a Cherenkov telescope. Furthermore, observations during strong moon light are possible with these devices allowing to enlarge the duty cycle of the telescope. This provides ideal conditions for long-term monitoring.

Among few other sources, mainly the near blazars Mrk421 and Mrk501 have been monitored with FACT at TeV energies. In the last 2.5 years, several flaring activities have been detected and FACT participated in several multi-wavelength campaigns. With more than 450 hours for Mrk 421 and more than 600 hours from Mrk 510, FACT provides a very complete data sample where for both sources more than 250 nights are covered. With this data sample, studies on the flare behaviour and duty cycle of the observed blazars can be carried out.

Results from 2.5 years of monitoring will be presented.

Radiation environment measurement onboard nanosatellite VZLUSAT1

Vladimír Dániel

Výzkumný a zkušební letecký ústav

Onboard nanosatellite VZLUSAT1 the Radiation Hardened Composites Housing (RHCH) material will be verified. For RHCH radiation properties evaluation the radiation environment sensors are used. Three XRB diodes are placed on the side wall of the nanosatellite. First sensor is placed without RHCH shielding, second with 1mm thick RHCH shield and third with 2mm thick RHCH shielding. For higher energies the spectral sensors based on CdTe material will be used inside the nanosatellite. The appropriate measurement electronics circuit is presented.

X-ray emission of Centaurus A

Christina Graefe

Remeis Observatory

Mechanical measurement of Composite structures exposed to cosmic radiation in Earth orbit on board of a „CubeSat“ satelite

Petr Hana

Technical University of Liberec

This article focuses on the comprehensive study and measurement of mechanical properties of new material structures with carbon fibber composites specifically designed for the construction of space satellites. Composite structures will be exposed to cosmic radiation in Earth orbit on board of a „CubeSat“ satelite. The aim was to develop a measurement methodology for determining the mechanical properties of composite structures in orbit. We realized a number of alumina and Composite Square vibrating plates samples with stickled thin piezoelectric plate used as piezoelectric transducer. It was compiled numerical simulation with given geometry including stickled thin piezoelectric sensor for description and evaluation mechanical properties.

IBWS workshops: Introduction and Historical Background

Rene Hudec

ASU AV CR & CVUT

I will give introduction and describe historical backround of IBWS workshops related to history of group of high energy astrophysics at Astronomical Institute Ondrejov

Analyses in Astronomical Photographic Archives

Rene Hudec

ASU AV CR & CVUT

Recent status of analyses in Astronomical Photographic Archives with emphasis on analyses of high energy sources in optical light will be briefky presented and discussed

Baker Nunn Camera Databases and their application in high energy astrophysics

Rene Hudec

ASU AV CR & CVUT

Baker Nunn Camera Databases and their application in high energy astrophysics will be introduced and discussed. The network cameras records enable analyses of optical sources up to mag 16 with fine time resolulution of few seconds and are hence perfectly suited e.g. for optical transient searches

COLORES on BOOTES-2, calibration

Martin Jelinek

IAA CSIC

A small lookup into spectroscopic calibration process and its results will be presented.

Oblique Magnetic Fields and the Role of Frame Dragging

Vladimir Karas

Astronomical Institute ASCR

Magnetic null points can develop near the ergosphere boundary of a rotating black hole by the combined effects of strong gravitational field and the frame-dragging mechanism. We show that the electric component does not vanish in the magnetic null, and so an efficient process or particle acceleration can occur. The situation is relevant for low-accretion-rate nuclei of some galaxies which exhibit episodic accretion events (such as the Milky Way\'s supermassive black hole) embedded in a large-scale magnetic field.

OPS-SAT: An ESA CubeSat as an in-orbit experiment laboratory

Ali Kheirkhah

Zentrum für Telematik

There are every year a large number of new innovative ideas generated by ESA and the European industry for evolving European space technology and mission operations. Patents are filled, studies, prototypes and breadboards produced, but the majority of the innovations never makes to orbit. The reason is the well-known problem: “Has never flown - will never fly”. Obviously, the risk aversion is healthy when dealing with large expensive missions but leaves little room for innovation.

The idea of OPS-SAT emerged to try to change the current situation, by providing a low cost in-orbit hard – and software laboratory available for authorised experimenters to test, demonstrate and validate their developments.

OPS-SAT is the first CubeSat designed for ESA and is a safe experimental platform flying in LEO. OPS-SAT makes available a reconfigurable platform, at every layer from channel coding upwards, and is available for experimenters to demonstrate innovative new software and mission operation concepts.

This paper reports on the functionality and the design of OPS-SAT developed during the Phase A/B1 executed by TU Graz (Austria), Zentrum für Telematik (Germany) and MAGNA Steyr (Germany).

SNRs in 3D

Matus Kocka

Masaryk University

TBD

SkCube

Matus Kocka

Masaryk University

Short talk about new Slovak pico-sat (cube-sat).

Ernie and Bert in the Radio: The TANAMI view of the IceCube PeV Neutrino events

Felicia Krauss

Remeis Observatory

F. Krauss, M. Kadler, K. Mannheim, J. Wilms, T. Beuchert, J. Blanchard, C.Bürkel, B. Carpenter, D. Eisenacher, D. Elsässer, C. Gräfe, A. Kappes, A. Kreikenbohm, I. Kreykenbohm, M. Langejahn, C. Müller, R.Ojha, E. Ros, R. Schulz, J. Trüstedt, on behalf of the TANAMI collaboration

The IceCube Collaboration has published their first results on an excess neutrino flux above the atmospheric background. Due to low atmospheric background at PeV energies, the highest energy events ('Ernie' and 'Bert') are the most likely ones to be of extraterrestrial origin.

We study the multiwavelength properties of AGN from the TANAMI sample that are positionally coincident with the two neutrino events. We combine multiwavelength data, including X-ray data from the XMM-Newton and the Swift satellite to construct broadband spectra.

First Statistical Tests for Clumpy-Torus Models: Constraints from RXTE monitoring of Seyfert AGN

Alex Markowitz

Remeis Observatory

We present an analysis of multi-timescale variability in line-of-sight X-ray absorbing gas as a function of optical classification in a large sample of Seyfert AGN to derive the first X-ray statistical constraints for clumpy-torus models. We systematically search for discrete absorption events in the vast archive of RXTE monitoring of 55 nearby type Is and Compton-thin type IIs.

We detect 12 eclipse events in 8 objects, roughly tripling the number previously published from this archive. Peak column densities span $\sim 4-26 \times 10^{22}$ cm^{-2}$. Event durations span hours to years. The column density profile for an eclipsing cloud in NGC 3783 is doubly spiked, possibly indicating a cloud that is being tidally sheared.

We infer the clouds' distances from the black hole to span $\sim 0.3 - 140 \times 10^4 R_{\rm g}$. In seven objects, the clouds' distances are commensurate with the outer portions of the BLR, or the inner regions of infrared-emitting dusty tori. We discuss implications for cloud distributions in the context of clumpy-torus models.

Hard X-ray monitoring for astrophysical application

Ladislav Pina

This work addresses the issue of the X-ray monitoring for astrophysical applications. The proposed wide-field optical system has not been used in space yet. A novel approach is based on use of 1D "Lobster eye" optics in combination with Timepix X-ray detector in energy range 3 - 40 keV. The proposed project includes theoretical study and functional sample of Timepix X-ray detector with multifoil wide-field X-ray \"Lobster eye\" optics. Optics focusing X-rays on a detector is the only solution especially in cases where the intensity of 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. The optical system could be used in a student rocket experiment at University of Colorado. Ideal opportunity is to extend the Cubesat of Pennsylvania State University with the hard X-ray telescope demonstrator consisting of optical module and Timepix detector.

Microvariability detection in type 2 quasars

Jana Polednikova

Instituto de Astrofisica de Canarias

We present results from a project focused on searching optical microvariability (also known as "intra-night" variability) in type 2 (obscured) quasars. For our study, we have observed a sample of three bright (V $<$17) type 2 quasars from San Pedro M'artir observatory in Mexico.

The sample was observed during an observation period of four days using Johnson’s V filter, resulting in at least two, quasi continuous intervals of observations per target during the observing period.

Statistical analysis of the microvariability was performed with one-way analysis of variance test (ANOVA) which proved to be a robust test for detecting microvariability.

Based on the results from the statistical analysis, we show that at least two out of the three observed targets are variable on the time scales of hours. So far, this is the first robust study which shows existence of optical microvariability in type 2 quasars.

Very soft X-rays: an almost neglected band for monitoring

Vojtech Simon

Astronomical Institute AS CR

Monitoring of X-ray emission of the cosmic X-ray sources is usually carried out in the energies of emission of 2 or more keV. Nevertheless, absorption of X-rays in the interstellar medium is sufficiently small even for the energies as low as 0.2-0.5 keV, which gives us opportunity to study the processes which produce emission in this band. We will discuss the astrophysical binary sources and their emission processes which at least sometimes produce very intense, even dominant very soft X-ray emission (E<1 keV). Such emission is beyond the band in which most monitors operate. These emission processes thus often remain unexplored, and in some cases the objects even remain undetected if this very soft emission is transient.

Accuracy of DSLRs

Petr Skala

CVUT

This talk deals with problematic whether is possible to use DSLR (digital single-lens reflex) cameras for precise measurement. Digital cameras have good cost to performance ratio thus they are good candidates as tools for digitalization of astronomy glass plates and photometric measurement. This paper show what affect output data accuracy of such devices.

OpenStack: An Open Source Cloud Platform

Gabriel Szász

Red Hat Czech, s.r.o.

Cloud computing has already become an essential technology for any organization that depends on complex IT infrastructure. This technology enables agile-style development, it scales automatically with infrastructure needs and it provides a platform for high-availability applications.

The OpenStack project provides powerful open source tool for building your own public and/or private clouds. Nowadays, it is the second largest open source project on this planet, right after Linux.

This short talk gives a brief overview of the cloud computing technology and its impact on modern science. Then it introduces the OpenStack project and compares it to the other open source cloud projects that are currently available.

NANOX - Proposed Nano-Satellite X-Ray Monitor

Vladimír Tichý

Czech Technical University in Prague

The concept of a nano-class satellite providing permanent monitoring of specified sky area in X-rays is presented. Using of Schmidt lobster optics is proposed. The results of experimental tests of the specimen of such optics show the mission is feasible.

Vertical self-gravity in discs and outer edge effects

Audrey Trova

Astronomical institute

For massive enough or/and extended gaseous disks, self-gravity is important and can partly govern hydrostatic equilibrium. According to Paczynski's approximation (Paczynski 1978), the vertical gravity field is a linear function of the surface density. This approximation, often used in the context of star formation and accretion in Active Galactic Nuclei, clearly fails in zones where gradients of density and thickness are noticeable (typically discs edges). By analytical means, we have estimated the vertical component caused by a vertically homogeneous disc (in integral and algebraic forms) with an accuracy better than 1%. At zeroth order, Paczynski\'s approximation can be corrected (i.e. Extended) and the new formula depends on the relative distance to the outer edge and the local disc thickness. We will present this two results which are interesting to better understand the impact of self gravity on the hydrostatic equilibrium and to better model the outer disc where most observations come from.

Distributed small systems for scientific applications in space

Tristan Tzschichholz

Zentrum für Telematik e.V.

Within the nationally funded YETE project, a distributed system of nodes is envisioned, capable of providing a platform for universal experiments and applications. The nodes may be small satellites, rovers, and groundstations. The goal of the project is to implement a universal wireless communication technology which allows seamless operation even in case of complete or partial node failure, as the wireless links go down even towards the sensor/ subsystem layer. The interal harness of a node is reduced to just the power lines. This particular approach is feasible for artificial aperture measurements (optical or RF), field strength measurements, radiation measurements, and so on especially in hazardous environments where system failures are to be expected. The system also allows for long chains of satellites or rovers (or a mix of both) for exploring surfaces of stellar objects.

PilsenCube picosatellite - project overview

Ivo Veřtát

University of West Bohemia

The main goals of PilsenCube picosatellite project will be presented as well as the main idea of subsystem technical solution.

RTS2 for people

Stanislav Vitek

CTU in Prague

During this talk I will give short overview about how to control any RTS2 based telescope in real-time with mobile web application.

Galactic Center Minispiral: Interaction modes of neutron stars

Michal Zajaček

Astronomical Institute, Academy of Sciences

Streams of gas and dust in the inner parsec of the Galactic Center form a distinct feature known as Minispiral, which has been studied in radio and infrared wavebands (Kunneriath et al., 2012). Large fraction of the Minispiral gas is ionized by radiation of stars present in the Nuclear Star Cluster (NSC). Based on the inferred mass in the inner parsec about 10^6 solar masses, over ~10^4 neutron stars should move in the sphere of gravitational influence of the SMBH. We estimate that a fraction of them propagate through denser (ionized) medium concentrated along three arms. Based on the density and the temperature of the gaseous medium, we discuss interaction regimes of magnetised neutron stars passing through the Minispiral region. The simulation results may be applied to other galactic nuclei hosting NSC where the expected distribution of interaction regimes may be quite different.

Posters

Elimination of barrel distortion using wide-field imaging system calibration

Elena Anisimova, CTU in Prague

Wide-field imaging systems are used as subsidiary monitoring equipment for robotic telescopes nowadays. These electro-optical systems usually complement the main telescope during acquisition of astronomical phenomena or support its operation e.g. evaluating the weather conditions. We have a deal with such kind of support for robotic telescopes as are BOOTES, TAD, BART and Pi of the Sky, which are or are planned to be integrated into GLORIA FP7 project until end of September 2014. Acquired images by mentioned imaging systems suffer from image distortion because of wide field of view of input lens (cca 180 deg.). It is mostly barrel distortion, which causes inability of astronomical software (IRAF, SExtractor) to process acquired image data. There are two ways how to solve this problem. Existing methods could be modified for processing of images taken by wide-field systems or lens distortion could be removed and existing algorithms could be applied. In the second case, it is necessary to carry out imaging system calibration and to apply geometrical transformations on processed image data. In this case, it is very important to find out, how elimination of distortion affects accuracy of astrometric and photometric measurement of stellar objects. In this paper we describe our experience in this area.

Flare Alerts for TeV Blazars from FACT

Daniela Dorner, Universität Würzburg

The First G-APD Cherenkov Telescope (FACT) is monitoring bright blazars at TeV energies. The main targets are the bright TeV blazars Mrk 421 and Mrk 501, but also other objects like 1ES 2344+51.4 and 1ES 1959+650 have been observed already with more than 200 hours each.

Thanks to using silicon based photosensors, observations during strong moon light are possible enlarging the duty cycle of the telescope. Also the stable performance of these photosensors makes the telescope an ideal instrument for long-term monitoring.

To provide fast response on the source activity and automatic flare alerts, a quick look analysis has been set up on-site. The results of this processing are immediately available on a public website allowing for fast flare alerts and target-of-opportunity observations.

In this presentation, results from the quick look analysis will be shown and the flare alert procedure

explained.

GLORIA Project and Investigation of Cataclysmic Variables

Rene Hudec, ASU AV CR & CVUT

GLORIA Project and Investigation of Cataclysmic Variables within this project will be briefly presented and discussed

GLORIA Project Telescopes BART and D50

Rene Hudec, ASU AV CR & CVUT

GLORIA Project Telescopes BART and D50 will be briefly presented and discussed

Zernike polynomials used for stellar object fitting

Petr Janout, CTU Faculty of Electrical Engineering

A Point Spread Function (PSF) of theoretical astronomical imaging system is considered to be time and space invariant. It means that the PSF is invariable within an exposed image. This assumption is however not fulfilled especially in the case of real wide-field imaging systems which are used as subsidiary monitoring equipment for robotic telescopes nowadays. Mentioned systems could be used for robotic telescopes as are BOOTES, TAD, BART and Pi of the Sky, which are integrated into GLORIA FP7 project. Optical aberrations are expected to be space variant in real wide-field imaging systems, e.g. coma is expected to have strong dependency on distance from the captured image center. It has an impact on the efficiency of the stellar astrometry and photometry algorithms which usually work supposing space and time invariance of the imaging system’s PSF. In this paper we use Zernike polynomials to form PSF of such space variant system: we study dependency of the Zernike polynomial parameters on position of the stellar objects. We assume coma, astigmatism and spherical aberration of the system.

Cosmic rays and their interaction with the earth's magnetic field

Leena Lhan, Institute of Physics and Electronics, University of Peshawar

GLORIA: status of the project after two years of lifespan

Stanislav Vitek, Czech Technical University in Prague

GLORIA (Global Roboric Telescopes Inteligent Array for e-Science) current status and results after two years of its lifespan will be presented and discussed.