BOOK OF ABSTRACTS

2019

Program

Small Satellites for Astrophysics & Instrumental Session

Astronomical Photographic Plate Collections

Real-Time Image Processing In Astronomy

High Energy Astrophysics

Posters

The open LaTeX template, AMCOS_booklet, used to generate this booklet is available at
https://github.com/maximelucas/AMCOS_booklet

Edited by Martin Urban for IBWS conference/workshop.
https://www.ibws.cz

Contents

About **7**
INTEGRAL/BART Workshop 7
Organizing committee 7
Scientific committee 7
Topics 8

Program **9**
Monday, May 20 9
Tuesday, May 21 10
Wednesday, May 22 11
Thursday, May 23 12
Friday, May 24 13

Small Satellites for Astrophysics & Instrumental Session **15**
Elżbieta Zocłońska: BRITE photometry analysis with Python 15
Jakub Kapus: skCUBE mission results and plans for future 15
Jakub Ripa: Background study for the future gamma-ray transient mission CAMELOT 16
Klaus Schilling: Pico-Satellite Formations for Innovative Earth Observation . . 16
Lakshminarasimhan Srinivasan: Distributed groundstations for small satellites . 17
Masanori Ohno: "CAMELOT" - future all-sky gamma-ray monitoring mission with a fleet of CubeSats 17
Rene Hudec: ESA SMILE and Czech Participation: Recent Status 17
Rene Hudec: ESA THESEUS and Czech Participation 17
Robert Filgas: RISEPix - a Timepix-based radiation monitor telescope onboard the RISESAT satellite 18
Thorsten Döhring: Review on the properties of iridium coatings for astronomical X-ray mirrors 18
Vladimír Dániel: All-sky monitoring CubeSat with X-ray LE demonstrator . . . 18
Zsolt Bagoly: Transient detection capacities of small satellite gamma-ray detectors 19

Astronomical Photographic Plate Collections **21**
Alexey Andreev: Virtual observatory in Kazan 21
Rene Hudec: Astronomical photographic data archives: recent status 21
Yura Nefedyev: Analysis of digital astronomical photographs of the lunar surface in various phase spaces 21

Real-Time Image Processing In Astronomy **23**
Martin Jelinek: A trio of boring bursts observed by D50 23
Martin Topinka: A long time ago in a galaxy far, far away as seen by JWST . . 23
Petr Skala: Algorithms for all - sky image astrometric calibration 23
Sergey Karpov: Scientific CMOS sensors for sky surveys 24
Simon Trcka: The first observation of an optical counterpart to a Short GRB from the Czech Republic: GRB160927A 24

High Energy Astrophysics **25**
Andrea Gokus: Dynamic SEDs of the variable blazar PKS 1510-089 25
Andrzej Zdziarski: Gamma-ray emission from Cyg X-1 and Cyg X-3 25
Arman Tursunov: Electromagnetized Galactic Centre and some related effects 25
Attila Meszaros: An Oppositeness in the Cosmology: Distribution of the Gamma-Ray Bursts and the Cosmological Principle 26
Constanze Seibert: X-Ray analysis of the AGN NGC1052 with XMM-Newton . 26
Ekaterina Sokolova-Lapa: Modeling the energy spectra of accreting X-ray pulsars at low accretion rates 26
Elzbieta Kuligowska: The use of Monte Carlo methods in studying FR II-type radio sources 27
Franco Giovannelli: Frontier Research in Astrophysics in the Gravitational-Wave Era 27
Jaroslav Merc: New Online Database of Symbiotic Variables: Symbiotics in X-rays 27
József Kóbori: Kilonova models: spherical vs. axisymmetrical 28
Karl Mannheim: Signatures of magnetoluminescence 28
Martin Brunner: The search for the origin of high energetic cosmic ray electrons 28
Michal Zajacek: Reverberation-mapping of distant quasars: time-lag determination using different methods 29
Ole Koenig: A study on cyclotron resonant scattering features ins GRO J1744-28 29
Philipp Thalhammer: Application of empirical and physical models to the X-Ray spectrum of Cen X-3 29
Sandor Pinter: High-redshift galaxy cluster candidates of GRB hosts with photometric redshift 30
Stefan Lindeholz: The Doppler Crisis of TeV Blazars and the Case of PKS 2155-304 30
Vladimir Karas: Tidal disruption events as the site of the evolving relativistic spectral line 30
Zdeněk Stuchlík: Ionized Keplerian disks around magnetized black holes 31

Posters **33**
Adrian Abel: NetSmART: Network of Small Robotic Telescopes for Universities 33

Alexey Andreev: Analysis of photometric systems on the basis of laws of interstellar extinction . . . 33
Jakub Ripa: Testing Isotropic Universe Using Properties of Gamma-Ray Bursts Detected by Fermi/GBM, CGRO/BATSE and Swift/BAT . . . 34
Jan Průša: Telescope D50 and data reduction . . . 34
Jan Štrobl: Small Binocular Telescope: the new epoch of BART . . . 34
Ladislav Sieger: VZLUSAT-1: Satellite temperature measurement in LEO and improvement method of temperature sensors calibration based on measured data . . . 35
Levente Borvak: A surprising behavior of gamma-ray bursts with known redshifts detected by the Fermi and Swift satellites . . . 35
Martin Urban: Temperature Dependence of the Pixel Threshold for the Timepix Detector: Preliminary Results . . . 35
Ondrej Nentvich: VZLUSAT-1: Thermal flux in the carbon fibre composite panel with the different coatings . . . 36
Sergey Karpov: High temporal resolution observations on small telescopes: FRB121102 case study . . . 36
Sergey Karpov: The study of coherent optical pulsations of redback millisecond pulsar PSR J1023+0038 on Russian 6-m telescope . . . 37
Simon Prudil: Advanced observing using RTS2 Python scripts . . . 37
Thorsten Döhring: Power Quality Evaluation for Observatories . . . 37
Tomasz Kundera: The oldest plates scanned in the Astronomical Observatory of the Jagiellonian University . . . 37
Vladimír Dániel: Radiation dosimetry and radiation shielding in LEO orbit on board the VZLUSAT-1 CubeSat . . . 38
Yura Nefedyev: Equenesitic analysis of comets using the collection of digitized EAO photographic plates . . . 38

List of Participants **39**

Useful Information **41**
How to get to the IBWS? . . . 41
Conference trip . . . 42

Partner Institutions and Sponsors **43**

INTEGRAL/BART Workshop

The INTEGRAL/BART Workshop (IBWS) 2019 is sixteenth in the series of successful workshops dedicated to high energy astrophysics and supporting ground-based experiments (e.g. robotic telescopes).

The workshop will be held in Karlovy Vary (Carlsbad), Czech Republic, May 20 – 24 2019. The IBWS is expected to start with a welcome cocktail in the evening, May 20, the scientific sessions will start in the morning, May 21.

Originally, the INTEGRAL/BART Workshop focused on the work of High energy astrophysics group in Astronomical Institute, Academy of Sciences of the Czech Republic and relevant international collaborators from the field, with intensive student participation.

Nowadays, the IBWS workshops promote regional collaboration in high-energy astrophysics with an emphasis on the interface between satellite projects and ground-based experiments (e.g. robotic telescopes).

Organizing committee

Veronika Maršíková	Rigaku Innovative Technologies Europe s.r.o.
Martin Urban	Czech Technical University in Prague, Czech Republic
Ondrej Nentvich	Czech Technical University in Prague, Czech Republic
René Hudec	Czech Technical University in Prague & Czech Academy of Sciences

Scientific committee

Rene Hudec	Attila Meszaros	Vladimir Karas	Thorsten Döhring
Karl Mannheim	Martin Jelínek	Joern Wilms	Alberto Castro-Tirado
Franco Giovannelli	Roberto Nesci	Klaus Schilling	Zsolt Bagoly
Werner Zeilinger	Norbert Werner		

Topics

SAT Small satellites for astrophysics & Instrumental session

All aspects of small satellites (pico, nano, CubeSats), projects presentations, scientific payloads for these satellites, BRITE. Satellite projects for HE astrophysics in general. Rocket experiments. Ground-based support for satellite projects and high energy astrophysics – robotic telescopes, Čerenkov telescopes, data analyses.

APP Astronomical Photographic Plate Collections

Digitization and astrophysical applications of astronomical photographic plate collections to discuss recent achievements and future plans with emphasis on applications in high-energy and frontier astrophysics.

RIP Real-Time Image Processing In Astronomy

Although IBWS is called "workshop", most of its workshop-like properties have evaporated with time, and as we still want it to be more interactive, more production-oriented and have the results more touchable, we would like to introduce an experimental workshop session.
This time, the topic will be Real-Time Image Processing In Astronomy. If you wish to participate in this session, please contact the session chair Martin Jelinek (mates@asu.cas.cz) in advance. The basic idea is to avoid general topics and get to the core as quick as possible. The invited speaker will summarize the general ideas, and participators of the session are expected to contribute directly to the topic, without spending time on things like introducing their observatory, telescopes etc. if not relevant to the task they are solving.

HEA High Energy Astrophysics

Both theoretical as well as observational aspects of high energy and very high energy astrophysics, both galactic and extragalactic, gamma-ray bursts

POS Posters

Monday, May 20

18:00–22:00	**Welcome Reception "U Draka"**

Tuesday, May 21

09:00–09:30	**Registration**		
09:30–09:45	**Opening and welcome notes**		
09:45–10:10		**Rene Hudec**	IBWS introduction and historical background
10:10–10:20	**Coffee break**		
	Chair: Zsolt Bagoly		
10:20–10:45	**SAT**	**Rene Hudec**	ESA SMILE and Czech Participation: Recent Status
10:45–11:05	**SAT**	**Elżbieta Zocłońska**	BRITE photometry analysis with Python
11:05–11:25	**SAT**	**Masanori Ohno**	"CAMELOT" - future all-sky gamma-ray monitoring mission with a fleet of CubeSats
11:25–11:35	**Coffee break**		
	Chair: Vladimír Dániel		
11:35–12:00	**SAT**	**Jakub Ripa**	Background study for the future gamma-ray transient mission CAMELOT
12:00–12:20	**SAT**	**Zsolt Bagoly**	Transient detection capacities of small satellite gamma-ray detectors
12:20–12:40	**SAT**	**Lakshminarasimhan Srinivasan**	Distributed groundstations for small satellites
12:40–14:10	**Lunch**		
	Chair: Robert Filgas		
14:10–14:45	**SAT**	**Klaus Schilling**	Pico-Satellite Formations for Innovative Earth Observation
14:45–15:20	**SAT**	**Jakub Kapus**	skCUBE mission results and plans for future
15:20–15:40	**SAT**	**Vladimír Dániel**	All-sky monitoring CubeSat with X-ray LE demonstrator
15:40–16:20	**Coffee break with Poster session**		
	Chair: Jakub Kapus		
16:20–16:45	**SAT**	**Robert Filgas**	RISESAT - a third satellite with the Timepix based radiation monitor
16:45–17:10	**SAT**	**Thorsten Döhring**	Review on the properties of iridium coatings for astronomical X-ray mirrors
17:10–17:30	**SAT**	**Rene Hudec**	ESA THESEUS and Czech Participation
19:00–22:00	**Conference dinner "U Draka"**		

Wednesday, May 22

	Chair: Petr Skala		
09:00–09:20	**APP**	**Alexey Andreev**	Virtual observatory in Kazan
09:20–09:45	**APP**	**Rene Hudec**	Astronomical photographic data archives: recent status
09:45–10:05	**APP**	**Yura Nefedyev**	Analysis of digital astronomical photographs of the lunar surface in various phase spaces
10:05–10:20	**Coffee break**		
	Chair: Martin Jelinek		
10:20–10:50	**RIP**	**Martin Jelinek**	A trio of boring bursts observed by D50
10:50–11:05	**RIP**	**Simon Trcka**	The first observation of an optical counterpart to a Short GRB from the Czech Republic: GRB160927A
11:05–11:40	**RIP**	**Martin Topinka**	A long time ago in a galaxy far, far away as seen by JWST
11:40–11:55	**Coffee break**		
	Chair: Martin Topinka		
11:55–12:20	**RIP**	**Petr Skala**	Algorithms for all - sky image astrometric calibration
12:20–12:40	**RIP**	**Sergey Karpov**	Scientific CMOS sensors for sky surveys
12:40–13:15	**RIP**	**Martin Jelinek**	Roundtable discussion
13:15–14:45	**Lunch**		
15:00–23:00	**Conference trip and dinner**		
	Tepla Abbey visit		
15:00	**Bus departure to Tepla Abbey (from the conference venue/library)**		
18:00	**Conference dinner in Tepla Abbey Hotel Restaurant**		
22:00	**Bus departure to Karlovy Vary**		
17:00–18:00		**Martin Topinka**	První fotografie černé díry (Public lecture in Czech language)

Thursday, May 23

	Chair: Andrzej Zdziarski		
09:30–10:05	**HEA**	**Attila Meszaros**	An Oppositeness in the Cosmology: Distribution of the Gamma-Ray Bursts and the Cosmological Principle
10:05–10:25	**HEA**	**Stefan Lindeholz**	The Doppler Crisis of TeV Blazars and the Case of PKS 2155-304
10:25–10:45	**HEA**	**Sandor Pinter**	High-redshift galaxy cluster candidates of GRB hosts with photometric redshift
10:45–11:10	**Coffee break**		
	Chair: Attila Meszaros		
11:10–11:30	**HEA**	**Andrea Gokus**	Dynamic SEDs of the variable blazar PKS 1510-089
11:30–12:00	**HEA**	**Michal Zajacek**	Reverberation-mapping of distant quasars: time-lag determination using different methods
12:00–12:25	**HEA**	**Ole Koenig**	A study on cyclotron resonant scattering features ins GRO J1744-28
12:25–13:45	**Lunch**		
	Chair: Andrea Gokus		
13:45–14:10	**HEA**	**Andrzej Zdziarski**	Gamma-ray emission from Cyg X-1 and Cyg X-3
14:10–14:30	**HEA**	**Vladimir Karas**	Tidal disruption events as the site of the evolving relativistic spectral line
14:30–14:50	**HEA**	**Jaroslav Merc**	New Online Database of Symbiotic Variables: Symbiotics in X-rays
14:50–15:40	**Coffee break with Poster session**		
	Chair: Sandor Pinter		
15:40–16:05	**HEA**	**Elzbieta Kuligowska**	The use of Monte Carlo methods in studying FR II-type radio sources
16:05–16:35	**HEA**	**Karl Mannheim**	Signatures of magnetoluminescence
16:35–16:55	**HEA**	**Philipp Thalhammer**	Application of empirical and physical models to the X-Ray spectrum of Cen X-3
16:55–17:15	**HEA**	**Constanze Seibert**	X-Ray analysis of the AGN NGC1052 with XMM-Newton
18:30–22:00	**Conference dinner "U Draka"**		

Friday, May 24

	Chair: Philipp Thalhammer		
09:00–09:50	**HEA**	**Franco Giovannelli**	Frontier Research in Astrophysics in the Gravitational-Wave Era
09:50–10:20	**HEA**	**Zdeněk Stuchlík**	Ionized Keplerian disks around magnetized black holes
10:20–10:40	**HEA**	**Arman Tursunov**	Electromagnetized Galactic Centre and some related effects
10:40–11:10	**Coffee break**		
	Chair: Arman Tursunov		
11:10–11:30	**HEA**	**Martin Brunner**	The search for the origin of high energetic cosmic ray electrons
11:30–11:50	**HEA**	**Ekaterina Sokolova-Lapa**	Modeling the energy spectra of accreting X-ray pulsars at low accretion rates
11:50–12:10	**HEA**	**József Kóbori**	Kilonova models: spherical vs. axisymmetrical
12:10–12:35		**Rene Hudec**	Roundtable discussion
12:35–12:55		**Franco Giovannelli**	Concluding Address
12:55–13:15		**Rene Hudec**	Concluding Remarks
13:15	**Lunch**		
	End of Workshop		

Program valid on: May 19, 2019, 20:00.
The latest version can be found at: `https://www.ibws.cz/program`

BRITE photometry analysis with Python

SAT

Elżbieta Zocłońska, Nicolaus Copernicus Astronomical Center, Poland

The satellites of BRITE constellation observe chosen field on the sky during six months. This results in a large amount of gathered data with gaps every hundred minutes. Astero-seismologists are provided with reduced data in the form of light curves that however still contain some trends of instrumental origin. I will talk about decorrelation and analysis of these data using Python scripts.

skCUBE mission results and plans for future

SAT

Jakub Kapus, Slovak Organisation for Space Activities, Slovakia

The first Slovak satellite skCUBE, wholly designed and built in Slovakia, was successfully launched into its orbit on June 23rd 2017. After 14 days in orbit, the communication between the radio and other subsystems ceased to work. Since then, only limited access to the satellite functions remains. The last packet was received on 12th January 2019 after 569 days on orbit. The satellite sent more than 2 million packets with valuable datasets. From the collected information it can be confirmed that most of the systems worked as designed. Most valuable data are from attitude determination and control system as well as from satellite power and communication subsystem. The skCUBE project was run by many enthusiasts and students mostly working voluntarily for the non-profit organization SOSA. The main goal was to bring hands-on experience with space technologies and components to a new generation of Slovak engineers. Thanks to valuable experience with skCUBE and developing collaboration with the Czech Republic, SOSA and it's partners decides to start a new, more challenging project of international Czechoslovak 3U nanosatellite called CSCube. This mission emphasized educational activities for Slovak and Czech schools, will do interesting science thanks to GRB detection payload and bring innovative technologies from both countries to space through it's IOD program.

Background study for the future gamma-ray transient mission CAMELOT

SAT

Jakub Ripa, MTA-Eötvös Loránd University, Hungary

This study presents a background estimation for the Cubesats Applied for MEasuring and LOcalising Transients (CAMELOT), which is a proposed fleet of nanosatellites for the all-sky monitoring and timing based localisation of gamma-ray transients with precise localization capability at low Earth orbits. CAMELOT will allow to observe and precisely localize short gamma-ray bursts (GRBs) associated with kilonovae, long GRBs associated with core-collapse massive stars, magnetar outbursts, terrestrial gamma-ray flashes, and gamma-ray counterparts to gravitational wave sources. The fleet of at least nine 3U CubeSats is proposed to be equipped with large and thin CsI(Tl) scintillators read out by multi-pixel photon counters (MPPC). A careful study of the radiation environment in space is necessary to optimize the detector casing, estimate the duty cycle due to the crossing of the South Atlantic Anomaly and polar regions, and to minimize the effect of the radiation damage of MPPCs.

Pico-Satellite Formations for Innovative Earth Observation

SAT

Klaus Schilling, University Würzburg, Germany

A paradigm change in spacecraft engineering can currently be observed: from traditional multi-functional, large spacecraft towards robust systems of networked, cooperating, distributed very small satellites. This will illustrated by pico-satellite formation examples in the application area of Earth observation. Appropriate baseline distances between detectors on-board raise challenging control requirements for attitude and orbit control. In combination with sensor data fusion in Earth observation, concrete examples under development in Wuerzburg include “TOM – Telematics earth Observation Mission”, a 3 pico-satellite formation for photogrammetric observations. It is part of the international missions TIM (Telematics International Mission), where partners from 5 continents contribute CubeSats for 3D Earth observation. In the CloudCT mission, clouds are characterized by computed tomography methods via 10 cooperating pico-satellites. Similar principles should be applicable for astrophysics missions, just by pointing away from Earth instead of towards Earth.

Distributed groundstations for small satellites

SAT

Lakshminarasimhan Srinivasan, University of Würzburg,

As scores of small satellites are built and launched, a number of small-scale groundstations are coming up across the world. Our research is on utilizing the resources available by pooling together groundstations to track one satellite for a longer period automatically. This talk will go into the scheduling and communication aspects of such an abstraction layer eventually also dealing with tricky security aspects.

"CAMELOT" - future all-sky gamma-ray monitoring mission with a fleet of CubeSats

SAT

Masanori Ohno, Eotvos Lorand University, Hungary

All-sky coverage combined with a precise localization is an important direction for multi-messenger astronomy to perform follow-up observations of the electromagnetic counterparts of gravitational wave sources. The idea of timing-based localization in the gamma-ray band with multiple CubeSats is a simple, powerful, and possibly unique solution. We have found, that with 9 satellites, equipped with large CsI scintillators readout by the multi-pixel photon counters, ten-arcmin-scale localization is achievable. We are now developing a mission called "Cubesats Applied for MEsureing and LOcalising Transients: CAMELOT". Further detailed studies on localization feasibility, the effect of the expected in-orbit background environment and various stages of demonstration flight experiments using prototype models are now rapidly proceeding. In this contribution, we will introduce our mission concept and the current status as well as the future prospects of this project.

ESA SMILE and Czech Participation: Recent Status

SAT

Rene Hudec, ASU AV CR CVUT, Czech Republic

Recent Status of ESA SMILE project and Czech participation will be briefly presented and discussed.

ESA THESEUS and Czech Participation

SAT

Rene Hudec, ASU AV CR CVUT, Czech Republic

Recent Status of ESA THESEUS project, a candidate mission selected by ESA within the M5 call, and recent and expected Czech participation in this project will be briefly presented and discussed.

RISEPix - a Timepix-based radiation monitor telescope onboard the RISESAT satellite

SAT

Robert Filgas, IEAP Czech Technical University in Prague, Czech Republic

RISESAT is a small Japanese experimental Earth-observing, science and technology demonstration satellite. One of the scientific instruments onboard is a miniature radiation monitor telescope with two Timepix detectors, developed and built at the Institute of Experimental and Applied Physics, CTU in Prague. After its successful launch in January 2019, it joined two other still operational satellites with our Timepix-based radiation monitors, SATRAM onboard the ESA satellite Proba-V (launched in 2013) and the Czech VZLUSAT-1 cubesat (launched 2017). In this work we present general technical and scientific details about the RISESAT satellite mission and a basic comparison of space weather monitoring from SATRAM and VZLUSAT-1 radiation monitors.

Review on the properties of iridium coatings for astronomical X-ray mirrors

SAT

Thorsten Döhring, Aschaffenburg University, Germany

During the recent years stress-compensated chromium-iridium coatings for X-ray mirrors have been developed successfully at Aschaffenburg University, thereby facing challenging technical requirements. This work was partially embedded in several binational projects (JEUMICO, JODEXRA, TRILAMICO, AXROCO, COPAXRA), gratefully funded by the Bavarian-Czech Academic Agency (BTHA). Within this conference contribution measurement results on the surface micro-roughness and on the layer structure of these coatings as well as on the coatings stress and its temporal behavior are presented. X-ray reflectivity measurements performed recently at the PANTER test facility at these coatings are compared with corresponding simulations and found to be in good agreement. It is intended to transfer these laboratory development results now to real applications in scientific satellite payloads for X-ray astronomy.

All-sky monitoring CubeSat with X-ray LE demonstrator

SAT

Vladimír Dániel, Czech Aerospace Research Centre, Czech Republic

Talk will describe the X-ray Lobster Eye (LE) telescope demonstrator for an all sky monitoring mission. The X-ray LE optics represents an alternative to recently used technologies, brings advantages and offers a cost-effective solution. The mission and payload are based on heritage and experience from the VZLUSAT-1 CubeSat and its 1D X-ray optics payload. Both the satellite platform and payload will be presented.

Transient detection capacities of small satellite gamma-ray detectors

SAT

Zsolt Bagoly, Eötvös University, Hungary

The new, small satellite based gamma-ray detectors, like CAMELOT, will provide a new way to detect gamma transients in the multi-messenger era. The efficiency and the detection capabilities of such a system will be compared with current missions, e.g. Fermi GBM. This can be used in the future to estimate the observable GRBs' parameters as well as other EM transients.

Virtual observatory in Kazan

APP

Alexey Andreev, Kazan Federal University, Russia

The paper focuses on creating a digital multidisciplinary virtual observatory. The virtual observatory includes: 1) Electronic databases of astrometric and astrophysical observations. 2) Digital data on modern star catalogues, planetary parameters, digital data on meteoroids, occultations and lunar objects. 3) Data system in the field of astronomical heritage according to UNESCO declaration (database on Russian astronomers, astroarchaeological objects, historical heritage of Russian space flights, etc.). 4) Creation of Astronomical Heritage Center. A virtual observatory of this kind is being developed for the first time in the world.

Astronomical photographic data archives: recent status

APP

Rene Hudec, ASU AV CR CVUT, Czech Republic

I will briefly present and discuss the recent status of astronomical photographic data archives worldwide, both photometric and spectroscopic, including digitization, pipelines, astrophysical use, and public access.

Analysis of digital astronomical photographs of the lunar surface in various phase spaces

APP

Yura Nefedyev, Kazan Federal University, Russia

This paper focuses on determining the positions of lunar objects using the collection of digital astronomical photographs of the Moon's surface produced at various optical librations in the star system. As a result, the selenographic coordinates for 1161 objects were obtained with accuracies 0,04±0,13 arcseconds in declination and 0,05±0,11 arcseconds in right ascension. The work also describes practical results on analyzing digital astronomical photographs in various phase spaces. The method allows transforming objects' coordinates from the photographs into celestial coordinate system with a high accuracy. The results produced may be applied in the field of space geodesy and navigation when analyzing various systems of digital images.

A trio of boring bursts observed by D50

RIP

Martin Jelinek, ASÚ AV ČR, Czech Republic

I will present three GRB optical afterglows detected by the 0.5m robotic telescope telescope in Ondrejov. While the afterglows themselves might be called rather boring - not much variability, faint, late detection - there is a story behind each of them that could be interesting to the audience.

A long time ago in a galaxy far, far away as seen by JWST

RIP

Martin Topinka, DIAS, Ireland

The JWST space telescope will be hopefully launched and thanks to its great sensitivity it will, apart from many other astonishing scientific tasks, uncover the mysteries of the origin of the first stars, first galaxies and look in details at some of the hot exoplanet candidates for extraterrestrial life. I will summarise the mission, discuss the main scientific goals and focus to some of the work I am involved in, namely the JWST deep field.

Algorithms for all - sky image astrometric calibration

RIP

Petr Skala, Czech Technical University in Prague, Czech Republic

A typical property of fish-eye lens is image distortion that complicates standard linear plate solving or even higher order polynomial fitting. A model that has to be used is dependent on lens projection type that can be extracted after elaborate catalog matching. New and optimized algorithm for image registration and plate solving of all-sky images will be presented. Presented algorithm for image registration is based on Generalized Hough Transformation GHT and provides multiple optimizations against previously used algorithm considering the speed of pattern detection and properties of image projection with a fish-eye lens to cover a wider area in the image. Astrometric calibration is obtained through precise catalog matching and exact model fitting.

RIP

Scientific CMOS sensors for sky surveys

Sergey Karpov, Institute of Physics, Czech Academy of Sciences, Czech Republic, Czech Republic

Scientific CMOS image sensors are a modern alternative for a typical CCDs offering both low noise, large sensitive area and high frame rates, which make them promising devices for a modern wide-field sky surveys. However, the peculiarities of CMOS technology have to be properly taken into account when analyzing the data, and in this talk I will briefly summarize my experience of working with two generations of Andor scientific CMOS sensors.

RIP

The first observation of an optical counterpart to a Short GRB from the Czech Republic: GRB160927A

Simon Trcka, University of Rhode Island, United States

The robotic telescope D50 in Ondřejov routinely follows-up the triggers of Gamma-Ray Bursts in order to study their optical counterparts. While the afterglows of long gamma-ray bursts are relatively bright, the optical emission of short bursts is much weaker and more difficult to detect. We present the first ever detected optical counterpart of a short burst detected by our robotic system and from the Czech Republic.

Dynamic SEDs of the variable blazar PKS 1510-089

HEA

Andrea Gokus, University of Wuerzburg/Remeis Observatory Bamberg ECAP, Germany

The blazar PKS 1510-089 is one of the most variable active galactic nuclei (AGN) in the gamma-ray sky and well monitored over the full spectral range. However, using simultaneous data to describe the spectral energy distributions (SEDs) of AGN with steady-state scenarios is degenerate. Here, we introduce an approach to use the concept of dynamic SEDs involving the search for correlations between physical parameters and the overall shape of time-resolved SEDs. We find that between 2008 and 2018, the GeV flux is in general a good proxy of the integrated keV to GeV high-energy emission of PKS1510-089. In contrast to this, no such strong correlation is found for the X-ray emission. The gamma-ray spectrum shows a harder-when-brighter trend, reminiscent of the canonical behavior of X-ray binaries.

Gamma-ray emission from Cyg X-1 and Cyg X-3

HEA

Andrzej Zdziarski, N. Copernicus Astrnomical Center,

In two recent papers, we presented measurements by the Fermi/LAT and theoretical interpretation of the gamma-ray spectra from two Galactic microquasars, Cyg X-1 and Cyg X-3. In both sources, orbital modulation (due to Compton anisotropy of scattered stellar photons from the donor) has been measured, which has allowed us to estimate of the location of the bulk of the gamma-ray emission. The theoretical interpretation of the broad-band spectra (from radio to gamma-rays) is based on extended-jet and accretion models, developed earlier. We have also measured cross-correlations between the gamma-rays and both radio and X-ray emission, which put constraints on the respective emission sites and, in the case of Cyg X-3, implies the presence of extended periods of advection of magnetic fields through the accretion flow.

Electromagnetized Galactic Centre and some related effects

HEA

Arman Tursunov, Silesian University in Opava, Czech Republic

I will present some new features of a supermassive black hole at the center of the Milky Way in relation to the combined effects of strong gravity and external electromagnetic fields on the plasma matter surrounding black hole.

An Oppositeness in the Cosmology: Distribution of the Gamma-Ray Bursts and the Cosmological Principle

HEA

Attila Meszaros, Charles University, Czech Republic

The Cosmological Principle is "the assumption that the universe is spatially homogeneous and isotropic in the large-scale average" (Peebles P.J.E., Principles of Physical Cosmology, Princeton Univ. Press, 1993, page 199). In year 1998 the author, together with his two colleagues, has shown that the BATSEś short gamma-ray bursts are not distributed isotropically on the sky. This claim was followed by other papers confirming both the existence of anisotropies in the angular distribution of bursts and the existence of huge Gpc structures in the spatial distribution. These observational facts are in contradiction with the Cosmological Principle, because the large scale averaging hardly can be provided. The aim of this lecture is to survey these publications.

X-Ray analysis of the AGN NGC1052 with XMM-Newton

HEA

Constanze Seibert, Julius Maximilian University Wuerzburg,

Relativically broadened iron lines can be used to study the accretion of matter onto supermassive black holes in active galactic nuclei (AGN) via X-ray spectroscopy. Radio-loud AGN are particularly important targets for such studies, because combined X-ray and radio studies might allow us to probe the connection between accretion and jet production. Unfortunately, broad-iron lines are rare among radio-loud AGN. A promising radio-loud candidate whose spectrum has been suggested to exhibit relativically broadened iron-line emission is the nearby two-sided jet system NGC 1052. Using data from the XMM-Newton satellite, we studied the X-ray spectrum (0.5 - 10 keV) of the pn-detector and compared various modelling approaches in order to test the broad-iron-line scenario in this important object.

Modeling the energy spectra of accreting X-ray pulsars at low accretion rates

HEA

Ekaterina Sokolova-Lapa, Dr. Karl Remeis-Observatory, ECAP FAU, Germany

The late studies point out that some X-ray pulsars show uncharacteristic bimodal energy spectrum in the low luminous state. We developed the model of the magnetized neutron star polar cap emission at low accretion rate case to explain this spectral behavior. At such rates, no accretion column is formed above the surface of the neutron star and the accreted matter hits the atmosphere. We calculate polarized radiative transfer in the atmosphere with nonuniform temperature and density profiles to model the radiation field. The model is applied to fit the spectrum of the X-ray pulsars GX304-1 observed by NuSTAR and Swift/XRT.

The use of Monte Carlo methods in studying FR II-type radio sources

HEA

Elzbieta Kuligowska, Astronomical Observatory of the Jagiellonian University, Poland

General Monte Carlo methods are a broad class of algorithms that rely on repeated random sampling to obtain reliable numerical results in many (not only) physical problems. The underlying concept is to use randomness to solve problems that might be deterministic in principle. They are often used in problems with many coupled degrees of freedom. We present the possible use of these methods in the long known case of the analytical model of Fanaroff-Riley type II radio sources, proposed by Kaiser et al. (1997, MNRAS, 292, 723) and assuming 'continuum injection' process in the jet-IGM interaction. Since this model it is characterized by a large number of free parameters, and originally requires knowing the number of source parameters a priori unknown, the use of Monte Carlo methods seems optimal. We discuss the application of these methods and their effectiveness and reliability in the case of studying the selected real radio sources.

Frontier Research in Astrophysics in the Gravitational-Wave Era

HEA

Franco Giovannelli, INAF-Istituto di Astrofisica e Planetologia Spaziali, Italy

In this review I would like to present an updated panorama about the Frontier Research in Astrophysics with particular emphasis on the most important results obtained for a better knowledge of the physics governing our Universe, and on the open problems that probably will be solved with the next generation space- and ground based experiments.

New Online Database of Symbiotic Variables: Symbiotics in X-rays

HEA

Jaroslav Merc, Pavol Jozef Šafárik University in Košice, Slovakia

Symbiotic variables belong to an interesting class of interacting binary stars. Since the beginning of this century, the systematic search for these objects has begun and such surveys have led to discoveries of many new objects and dozens of candidates in the Milky Way and the Local Group. As the latest catalog of symbiotic binaries is almost two decades old, we decided to prepare a new, online database of the galactic and extragalactic symbiotic systems. These objects are also known for their X-ray emission. For the purpose of this work, we have prepared a census of symbiotic binaries and their properties based on observations obtained by X-ray satellites in the previous decades. As our review has shown, the X-ray emission seems to be a common feature of symbiotics with a white dwarf, preferentially detected from nearby sources.

HEA

Kilonova models: spherical vs. axisymmetrical

József Kóbori, Eötvös University, Hungary

Detecting the afterglows of double neutron star merger events is a challenging task because of the quick fading of the observed flux. In order to create an efficient observing strategy for their observing process it is crucial to know their intrinsic rate. Unfortunately, the numerous models existing today predict this rate on a vary wide range. In my talk I will compare the different levels of kilonova approximations in order to determine their reliability. Also, I will show the effect of different ejecta mass lay-outs on the light curve shape and the estimated kilonova rate.

HEA

Signatures of magnetoluminescence

Karl Mannheim, Universität Würzburg, Germany

Diffusive shock acceleration has been the leading contender to explain particle acceleration in blazars for decades. Recent observations of short time-scale variability are in tension with the shock-acceleration mechanism but in agreement with theoretical predictions for magnetoluminescence driven by relativistic magnetic reconnection.

HEA

The search for the origin of high energetic cosmic ray electrons

Martin Brunner, Universität Würzburg, Germany

Using cosmic ray electron spectra measured by HESS, Magic, and Fermi-LAT, we determine the region of their origin in our Galaxy. We infer the region by fitting the solution of the cosmic ray electron diffusion equation to the data. The energy losses lead to a distance-dependent turnover energy in the electron spectrum placing the boundary for the source distribution at a distance of 3 kiloparsecs from the solar system. The sources injecting cosmic ray electrons are also copious producers of gamma rays. Comparing the cumulative flux of gamma-ray sources within 3 kpc with the required injection rate of electrons, we can check the consistency of the model.

Reverberation-mapping of distant quasars: time-lag determination using different methods

HEA

Michal Zajacek, Center for Theoretical Physics, Poland

By applying different statistically robust methods, we analyze the time-lag between the continuum and ionized line-emission (Mg II line) light curves for the distant bright quasar CTS C30.10 (redshift z 0.9). The data were obtained by the SALT telescope. In detail, we demonstrate the application of several methods using discreet correlation function (DCF), z-transformed discreet correlation function (zDCF), von Neumann estimator, and the JAVELIN code package. In particular, we discuss the uncertainties of these methods. In conclusion, we find that the quasar lies on the broad-line region (BLR) size – monochromatic luminosity power-law scaling, which was already confirmed for low-redshift sources. In case the BLR size-luminosity relation holds for other distant sources, quasars could be used for probing cosmological models as "standard candles" complementary to supernovae Ia.

A study on cyclotron resonant scattering features ins GRO J1744-28

HEA

Ole Koenig, Dr. Karl Remeis Observatory, Germany

GRO J1744-28 (aka. the Bursting Pulsar) is a low-mass X-ray binary (LMXB) with a proposed cyclotron resonant scattering feature (CRSF) at 4.7keV. Typically LMXBs have relatively low magnetic field strengths - generally believed to be not sufficiently strong for CRSFs - and this claim belongs to the few CRSF reports in LMXBs at energies <10keV. This talk is about NuSTAR data of the forth reactivation phase in 2017 which does not show significant absorption features in its spectrum. I will show results from spectral fitting and present a rigorous search for a CRSF. Based on detailed Monte Carlo simulations we can rule out a significant line at the >2sigma level.

Application of empirical and physical models to the X-Ray spectrum of Cen X-3

HEA

Philipp Thalhammer, Dr. Karl Remeis Observatory, Germany

We successfully described the combined Swift/XRT and NuSTAR spectrum of Cen X-3 with empirical and physical models. For the fitting procedure of the physical continuum model by Becker Wolff (2007) we implemented a new approach to ensure energy conservation during the 2 minimization. We found that this new method can simplify the usage of the model considerably.

High-redshift galaxy cluster candidates of GRB hosts with photometric redshift

HEA

Sandor Pinter, National University of Public Service, Hungary

To better understand the the phenomena of gamma ray bursts and the physical properties of the progenitors in high-redshift host galaxies we have to know not only the distance of the host galaxy itself but the hostś location in its local galaxy cluster. Using deep Subaru Hyper Suprime-Cam observations for a chosen z=0.8 GRB we are giving constraints on photometric redshifts of the parent galaxy cluster via statistical methods.

The Doppler Crisis of TeV Blazars and the Case of PKS 2155-304

HEA

Stefan Lindeholz, Julius-Maximilian-University Würzburg, Germany

Using Very Long Base Line Interferometry (VLBI) we can resolve the parsec-scale jet structure of blazars in the radio regime and measure the bulk velocity of the jet plasma. Apparent superluminal motion is a common phenomenon observed in many blazars due to bulk relativistic motions at small inclinations to the line of sight. However, many BL Lac objects whose gamma-ray emission extends up to TeV energies and whose strong gamma-ray variability indicates very high relativistic Doppler factors are known to have only relatively slow VLBI jets. This unresolved contradiction has become known as the Doppler crisis of TeV blazars. We present new VLBI results from the TANAMI program for one of the brightest and most variableTeV blazars in the sky, PKS 2155-304, and discuss the results in the context of the Doppler crisis.

Tidal disruption events as the site of the evolving relativistic spectral line

HEA

Vladimir Karas, Astronomical Institute, Czech Academy of Sciences, Czech Republic

In nuclei of galaxies strong tidal forces can destroy stars passing within critical distance from the central supermassive black hole (SMBH). Observational signatures of tidal disruption events depend on the environment around the SBMH horizon and the level of its accretion activity. We consider a system where the material remnant from the disrupted star forms a gaseous ring that circularises and gradually spreads in radius by viscous process. We consider the case of a remnant trail embedded in a hot environment and illuminated by X-rays from the surrounding corona or the base of a jet. The evolving spectral features provide a novel way to reveal the parameters of the system, namely, the distance of the remnant gas from the SMBH, the radial extent of the trail, and the spin of the SMBH.

Ionized Keplerian disks around magnetized black holes

HEA

Zdeněk Stuchlík, Silesian University in Opava, Czech Republic

Properties of charged particle motion in the field of magnetized BHs imply four possible regimes of behavior of ionized Keplerian disks: survival in regular epicyclic motion, transformation into chaotic toroidal state, destruction due to fall into BH, destruction due to escape to infinity along magnetic field lines (Kerr BH only). Due to extremely efficient magnetic Penrose process particles escaping to infinity could form UHECRs.

NetSmART: Network of Small Robotic Telescopes for Universities

POS

Adrian Abel, Philipps University Marburg, Germany

A group of universities have come together with the aim of designing and developing small aperture robotic telescopes (SmART) for use by students to observe variable stars and transient follow–ups. The group is deliberating on the components of the robotic system e.g. the telescope, the mount, the back-end camera, control software etc and their integration keeping in mind the scientific objectives. The Marburg group is studying variable stars using photometric and spectroscopic observations in a small local observatory and via analysis of photo plate archival data mainly from Sonneberg observatory (Thuringa, Germany). Our goal is to setup a small, affordable observatory at Marburg University with full remote access to all components. Among others the future measurements can be follow–ups, variable stars, exoplanet search and spectroscopic measurements, e.g. in cooperation with the BRITE–constellation. The open source software package INDI (alone or combined with KStars) is suitable for controlling an observatory. The tool RTS2 offers functionality like scheduling to enable autonomous operation. However, a software for integrating single observatories into a network still has to be developed. We would like to invite other universities and interested astronomers to join the project and cooperate in setting up a network of small aperture robotic telescopes (NetSmART) around the globe.

Analysis of photometric systems on the basis of laws of interstellar extinction

POS

Alexey Andreev, Kazan Federal University, Russia

Based on the astronomical photographs digital database of Engelhardt astronomical observatory and using the software for analyzing brightness characteristics, the connections between UBV photometric systems (PSC UBV) for various laws of interstellar extinction are calculated. This dependency is used further to reduce stellar magnitude of stars in the area studied to the standard system. It is shown that the greater difference in the response curves of the systems is, the more the difference in PSC UBV for various laws of interstellar extinction is observed.

Testing Isotropic Universe Using Properties of Gamma-Ray Bursts Detected by Fermi/GBM, CGRO/BATSE and Swift/BAT

Jakub Ripa, MTA-Eötvös Loránd University, Hungary

Previously we proposed a novel method to inspect the isotropy of the properties of GRBs such as their duration, fluences and peak fluxes at various energy bands and different time scales. The method was then applied on the Fermi GBM Burst Catalog containing 1591 GRBs and except one particular direction where we noticed some hints of violation from statistical isotropy, the rest of the data showed consistency with isotropy. In this work we apply our method with some minor modifications to the updated Fermi/GBM data sample containing 2266 GRBs (thus about 40% larger). We also test other two major GRB catalogs, the BATSE Current GRB Catalog of the CGRO satellite containing about 2000 bursts and the Swift/BAT Gamma-Ray Burst Catalog containing about 1200 bursts. The new results show proper consistency with isotropy confirming our previous findings and discarding any statistically significant anisotropic feature in the data.

Telescope D50 and data reduction

Jan Průša, ASÚ AV ČR, Czech Republic

Autonomous robotic telescope D50 is a 50 cm reflector, located at the observatory of Astronomical Institute of the Czech Academy of Sciences in Ondřejov (Czech Republic). It is used primarily to observe high-energy emitting objects in visual band - such as gamma-ray bursts, active galaxies, cataclysmic variable stars and similar objects. We decided to use the archive of the telescope, to try and process the data of several already observed objects and examine different ways of processing. This work is part of my high school internship, carried out thanks to the project "Otevřená věda".

Small Binocular Telescope: the new epoch of BART

Jan Štrobl, ASÚ AV ČR, Czech Republic

BART (Burst Alert Robotic Telescope) is an autonomous robotic observatory located at Ondrejov observatory in Czech Republic. It was constructed in 1998 in order to follow-up satellite triggers in hope to provide early observations of Gamma-Ray Burst optical afterglows. We present the new telescope of the observatory "Small Binocular Telescope" (SBT), which has recently obtained its first light and is being prepared for routine observations. The updated system now counts with a dual 0.2m wide-field optical telescope capable of continuous coverage of an errorbox of size up to 3.53.5 degrees.

VZLUSAT-1: Satellite temperature measurement in LEO and improvement method of temperature sensors calibration based on measured data

Ladislav Sieger, Czech Technical University in Prague, Czech Republic

This article describes the temperature measurement on board of nanosatellite CubeSat class VZLUSAT-1 and its calibration. There are several thermometers, with analogue and digital output as well, which are necessary for accurate measurements to calibrate under a vacuum condition or apply post-processing corrections. In this paper is described the issue of calibration in the thermal vacuum chamber and its improvement on the orbit. The usage of platinum sensors RTD PT1000 and digital sensors HYT 271 as the reference is discussed as well. A correction of non-linearity of PT1000 as well as minimisation of the influence of the variable measuring current due to temperature change. The variable current correction is a function of temperature and nanosatellite position on the orbit. The measured temperatures are below -50C in the Earth's shadow and in higher than +80C after irradiation of the Sun.

A surprising behavior of gamma-ray bursts with known redshifts detected by the Fermi and Swift satellites

Levente Borvak, University of Dallas, United States

In this contribution gamma-ray bursts with known redshifts are studied. It is shown that an inverse behavior - namely that apparently fainter bursts can on average be at smaller redshifts - can happen. In fact, the results of Mészáros et al. (2011, AA, 529, A55) are supported by these newer samples from the Fermi and Swift satellites.

Temperature Dependence of the Pixel Threshold for the Timepix Detector: Preliminary Results

Martin Urban, Czech Technical University in Prague, Czech Republic

Timepix detector, as well as any other semiconductor detector, is affected by noise in the semiconductor structure. This poster describes very first results of the Timepix equalization and its validity under different conditions.

VZLUSAT-1: Thermal flux in the carbon fibre composite panel with the different coatings

Ondrej Nentvich, Czech Technical University in Prague, Czech Republic

Nanosatellite VZLUSAT-1 is the first Czech CubeSat, and it was launched in June 2017 into the LEO orbit. The VZLUSAT-1 is technological satellite which contains many measurements and one of them is thermal flux measuring in the carbon-fibre-reinforced plastic (CFRP) material with different kinds of coatings on one of tilting panels. This material has the ambition to be used as a new, lightweight construction material for small satellites with radiation shielding capability. Its reflective ability with the different coatings (Au, Ni) and thermal flux in the bare material is evaluated based on thermometers Pt1000 placed on both sides during nanosatellite's lifetime under space conditions. This paper describes principles of the measurement with its constraints and differences between coatings material of the CFRP. Collected data represent measurements during 22 months of the VZLUSAT-1 mission.

High temporal resolution observations on small telescopes: FRB121102 case study

Sergey Karpov, Institute of Physics, Czech Academy of Sciences, Czech Republic, Czech Republic

To demonstrate the potential of a small telescopes for a high temporal resolution astrophysics, we observed the field of FRB121102 repeating source of fast radio bursts on a D50 telescope equipped with Andor EMCCD. We characterized the noise properties of the detector and used it to constrain the rate and amplitude of rapid optical flashes on a time scale of about ten milliseconds at the source position. We also studied the apparent variability of the stars around it, and use their properties to investigate the the potential of D50 for detecting faint optical variability on a sub-second time scales.

The study of coherent optical pulsations of redback millisecond pulsar PSR J1023+0038 on Russian 6-m telescope

POS

Sergey Karpov, Institute of Physics, Czech Academy of Sciences, Czech Republic, Czech Republic

We observed the PSR J1023+0038 millisecond redback pulsar in its accreting regime on two nights in Nov 2017 on Russian 6-m telescope with a high temporal resolution panoramic photon counter in two-channel ("blue" and "red") setup. During 400 seconds of nearly 8 hours of total observations, we detected a coherent optical pulsations in both color bands with 1.69 ms period, corresponding to the rotational period of neutron star known from radio data, with amplitudes of 2.8% ("red") and 1.7% ("blue"). Corresponding luminosity of pulsed component is about 10^{31} erg/s and may be caused by a synchrotron emission of electrons with moderate Lorentz factors close to a light cylinder

Advanced observing using RTS2 Python scripts

POS

Simon Prudil, ASÚ AV ČR, Czech Republic

This poster will present new possibilities we have thanks to using Python scripts beside the RTS2 observing system for robotic telescopes. This extension allow us to do more complicated observations and make our work more effective.

Power Quality Evaluation for Observatories

POS

Thorsten Döhring, Aschaffenburg University, Germany

Within the bilateral Slovak-Bavarian project SLOBATCO the question did arise to what extend observatories have to rely on adequate power quality, e.g. on the perfect sinusoidal shape of supply voltage and current, in order to ensure safe operation and accurate measurement results. International power quality standards are put in perspective with requirement specifications. Telescope operators indicated partial or total loss of function of measurement instruments. Measurements conducted during the SLOBATCO project substantiate the need for power quality measurement campaigns.

The oldest plates scanned in the Astronomical Observatory of the Jagiellonian University

POS

Tomasz Kundera, Astronomical Observatory of the Jagiellonian University, Poland

In our plate archive we have found some plates dated to 1912. It was very curious as at that time there was no instrument in the observatory able to make them. There was no such instrument in the whole country even, so we have made a research about their origin and the event registered.

Radiation dosimetry and radiation shielding in LEO orbit on board the VZLUSAT-1 CubeSat

POS

Vladimír Dániel, Czech Aerospace Research Centre, Czech Republic

More than 13 month observations were performed sampling the space radiation environment along the VZLUSAT-1 CubeSat satellite orbit and also showing changes in radiation belt profiles in terms of composition and intensity during the studied periods. Also a set of XRB diodes measuring the ionizing doses (TID) of the background radiation comparing it with TID under novel composite radiation shielding material on board will be presented.

Equenesitic analysis of comets using the collection of digitized EAO photographic plates

POS

Yura Nefedyev, Kazan Federal University, Russia

The work considers equenesitic analysis of Bennett, Arend-Roland, and 45P/Honda comet images on the basis of astronomical photographs database of Engelhardt astronomical observatory. Using the software aimed at analyzing the brightness of digital images, structural models for 3 comets were developed. The isophotes of their nuclei, comas, and tails were determined as well. As the cometary nuclei are the elements of dynamical evolution and processes in the Solar Nebula, the study of digital database on comets is going to allow refining the theory of their formation and evolution.

List of Participants

Adolf Inneman	Czech Republic
Adrian Abel	Germany
Alexey Andreev	Russia
Andrea Gokus	Germany
Andrzej Zdziarski	
Arman Tursunov	Czech Republic
Attila Meszaros	Czech Republic
Constanze Seibert	
Ekaterina Sokolova-Lapa	Germany
Elzbieta Kuligowska	Poland
Elżbieta Zocłońska	Poland
Franco Giovannelli	Italy
Jakub Kapus	Slovakia
Jakub Ripa	Hungary
Jan Průša	Czech Republic
Jan Štrobl	Czech Republic
Jaroslav Merc	Slovakia
Jedrzej Gorski	Poland
Joern Wilms	Germany
József Kóbori	Hungary
Karl Mannheim	Germany
Klaus Schilling	Germany
Ladislav Pína	Czech Republic
Ladislav Sieger	Czech Republic
Lakshminarasimhan Srinivasan	
Levente Borvak	United States

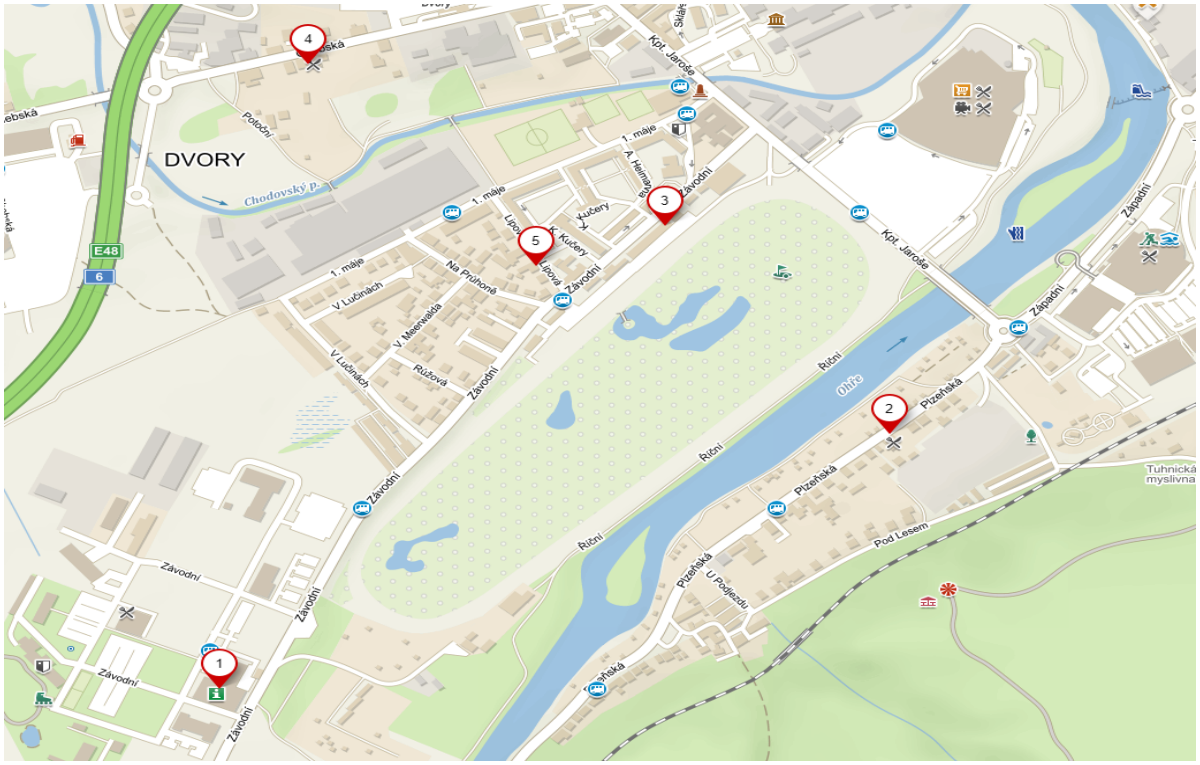
Martin Brunner	Germany
Martin Jelinek	Czech Republic
Martin Topinka	Ireland
Martin Urban	Czech Republic
Masanori Ohno	Hungary
Michal Zajacek	Poland
Ole Koenig	Germany
Ondrej Nentvich	Czech Republic
Petr Skala	Czech Republic
Petr Svoboda	Czech Republic
Philipp Thalhammer	Germany
Rene Hudec	Czech Republic
Robert Filgas	Czech Republic
Sandor Pinter	Hungary
Sergey Karpov	Czech Republic
Simon Prudil	Czech Republic
Simon Trcka	United States
Stanislav Vitek	
Stefan Lindeholz	Germany
Thorsten Döhring	Germany
Tomasz Kundera	Poland
Veronika Maršíková	Czech Republic
Vladimír Dániel	Czech Republic
Vladimir Karas	Czech Republic
Yura Nefedyev	Russia
Zdeněk Stuchlík	Czech Republic
Zsolt Bagoly	Hungary

How to get to the IBWS?

The IBWS meeting will be held in the Regional Library.
(`http://www.knihovna.kvary.cz/en/`)

Accommodation is arranged in the hotels close by. You can find all the hotels in the map below, all the hotels are within walking distance from the library (approx. thirty minutes walk).

1. **Regional Library (IBWS)**
   ulice Závodní 378/84, Karlovy Vary, 360 06, okres Karlovy Vary
   50.2181567N, 12.8271861E
2. **Pension "U Draka"**
   ulice Plzeňská 1483/31, Karlovy Vary, 360 01, okres Karlovy Vary
   50.2219872N, 12.8396692E
3. **Pension "U Šimla"**
   ulice Závodní 19/1, Karlovy Vary, 360 06, okres Karlovy Vary
   50.2251244N, 12.8354825E
4. **Pension "U Karela IV"**
   50°13'39.182"N, 12°49'43.837"E
   50.2275506N, 12.8288436E
5. **Pension "Anna"**
   ulice Lipová 290/9, Karlovy Vary, 360 06, okres Karlovy Vary
   50.2245236N, 12.8330817E



Conference trip

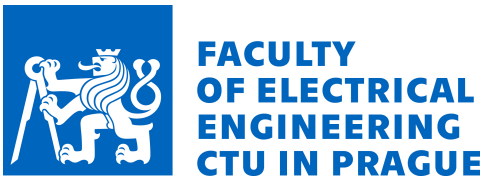
- **15:00** Bus departure to Tepla Abbey (from the conference venue/library)
- **18:00** Conference dinner in Tepla Abbey Hotel Restaurant
- **22:00** Bus departure to Karlovy Vary

Teplá Abbey (Czech: Klášter Teplá; German: Stift Tepl) is a Premonstratensian abbey in the western part of Bohemia, included in the Archdiocese of Prague; it was founded in 1193 by the blessed Hroznata, a Bohemian nobleman (d. 1217). The first monks came from the Abbey of Strahov in Prague.

The present monastery building was erected by Abbot Raimund Wilfert II (1688-1724); the library was built by Abbot Gilbert Helmer (since 1900). The Romanesque church, with additions in the style of the transition to the Gothic, is one of the oldest churches of Bohemia. The high altar of the church was sculpted by Josef Lauermann and Ignatius Platzer in 1750. After Hroznata was beatified in 1897, his reliquary casket was moved to the apse of the church for display. The original burial place of Hroznata is marked by on the floor before the main altar, where his original sarcophagus also stands.

Photo source: Google Maps - Gertrude Webhofer
Information source: Wikipedia.org

Partner Institutions and Sponsors



INTEGRAL/BART Workshop
20 – 24 May 2019
Karlovy Vary, Czech Republic
https://www.ibws.cz