



ABSTRACT BOOK

8th Gaia Science Alerts Workshop

6-8 December 2017

Warsaw University Astronomical Observatory, Poland

The titles are sorted following the agenda of the workshop.

Workshop's agenda on-line:

<https://www.ast.cam.ac.uk/ioa/wikis/gsawgwiki/index.php/Workshop2017:agenda>

Gaia overview and reports

Simon Hodgkin

Institute of Astronomy, University of Cambridge, UK

I'll give a summary of the current status of the Gaia Alerts system.

PLATO Science Flux Alerts

Steve Boudreault

Max Planck Institute for Solar System Research

The ESA mission PLANetary Transits and Oscillations of stars (PLATO) is aiming at obtaining light curves of a few hundred thousand stars for detection of planetary transits and the characterization of the host star with asteroseismology. It is likely that, during PLATO's lifetime, interesting events other than planetary transits or stellar oscillation will be detected, including supernovae, gamma-ray-burst, gravitational microlensing, stellar superflares, and other unexpected and unclassified transient events. The goal of the Science Flux Alerts is to detect and give an alert about a possible detection of one of these rare events, to trigger additional follow-up observations, considering their brevity and non-repeatability, while they are in progress.

First results of spectroscopic and photometric survey of the northern sky at Moletai AO for the PLATO 2.0 input catalog

Erika Pakstiene

Institute of Theoretical Physics and Astronomy, Vilnius University

Current photometric catalogs and spectroscopic surveys are still not able to provide all the necessary variability and spectroscopic information that is required for a development of the European Space Agency PLATO space mission input catalogue. Together with our partners, we perform the photometric and spectroscopic survey of the northern sky fields that potentially will be targeted by the PLATO mission. The aim of this study is to contribute in developing of the PLATO input catalogue by delivering the long-duration stellar variability information of PLATO fields in the northern-sky and a full spectroscopic characterisation of brightest targets. We use two telescopes of the Institute of Theoretical Physics and Astronomy at Vilnius University (ITPA VU) equipped with a high-resolution spectrograph and a CCD camera. At the moment we already have our first results: spectrometric analysis of 140 stars and catalogue of photometric light curves of 4600 stars.

Observations of transient astrophysical objects at Konkoly Observatory

Róbert Szakáts

Konkoly Observatory, Research Center for Astronomy and Earth Sciences, Hungarian Academy of Sciences

Optical follow-up observations of supernovae are done on a regular basis at the Konkoly Observatory. In addition to the existing equipment, we are building a new, 80 cm robotic telescope which will be fully dedicated to collect optical data of transient astrophysical objects during the TAO GINOP project. Not only supernovae, but merging binaries, tidal disruption events and VO alerts will be followed-up with it.

Solar system objects alert

Thuillot William

Paris Observatory - IMCCE

Since October 2016, the short term process for the Solar System Object Gaia data is operating and alerts are triggered through the Gaia-FUN-SSO network. I will present the recent activities for these Solar System Object alerts and will give the first results obtained.

Discovery of the small Solar system bodies with OMT-800 telescope

Volodymyr Troianskyi

Astronomical Observatory, Odessa National University

Serbian-Bulgarian mini-network telescopes and Gaia-FUN-TO during 2017

Goran Damjanovic
Astronomical Observatory Belgrade

Last three years (period October 2014 - October 2017) we observed about 45 Gaia-FUN-TO objects. During 2017 (until October) about 15 objects were observed and some of them, as Gaia16aye one, lot of times. To do that, at 2017 we used 5 instruments of the Serbian-Bulgarian mini-network telescopes, because the 60cm Rozhen telescope (Bulgaria) is still under reconstruction, but from mid-2016 we are doing with the 1.4m ASV (Serbia) one. That instrument was done via Belissima project, and the first data are very good. Some results about Gaia-FUN-TO will be presented, here.

Linking Gaia Alerts, supernovae and education

Fraser Lewis
Faulkes Telescope Project, Cardiff University

We discuss the opportunities presented to our teachers and their pupils via Gaia Alerts. We show examples of STEM activities and will demonstrate the opportunity that a return to "real-time" observing with the Faulkes Telescopes will bring.

Project Solaris

Milena Ratajczak
University of Wrocław

Project Solaris is a Polish initiative opening a new frontier in the field of circumbinary extrasolar planets hunting, as well as stellar astrophysics. With a global network of four autonomous observatories (0.5-m telescopes located in Africa, Australia, and South America), we aim to detect circumbinary planets around eclipsing binary systems using eclipse timing and characterize components of binary systems with an unprecedented precision to test stellar structure and evolution models. The network has a much wider application - from satellites tracking (via SST program) to following science alerts of missions like Gaia.

Search for young transiting exoplanets within YETI project

Pawel Zielinski
Warsaw University, Astronomical Observatory

The Young Exoplanet Transit Initiative (YETI) is a project focused on the photometric monitoring of stellar open clusters in order to find new young transiting exoplanets, eclipsing binaries and study other variability phenomena. Despite the fact that today we know more than 3600 exoplanets, there is a lack of confirmed transiting exoplanets around stars younger than 100 Myrs. Vast majority of the clusters surveyed for transits are several Gyrs old and this is one of the main reasons that we cannot answer the question whether the giant planets form by gravitational contraction or by core accretion. Therefore, searching for planets around stars in young clusters is critically important to test various aspects of current models of planet formation and evolution. Here, we present project status and plans for future photometric campaigns of three open clusters younger than 50 Myrs: NGC 869, NGC 884 and IC 4665, by using the world-wide 1 meter-class telescope network. Recent promising results of the investigation of several open clusters and the follow-up study are also discussed. Based on the YETI network experience, we expect to confirm several young transiting objects: low-mass stars, brown dwarfs and exoplanets.

Gaia Target Selection on the Liverpool Telescope - Patterns in Alerts

Andrzej Piascik
ARI Liverpool John Moores University

MOPTOP — The New Polarimeter for the LT

Helen Jermak
ARI, LJMU

Following the success of the 'RINGO' series of polarimeters, we are now building the next generation polarimeter for the Liverpool Telescope. The new instrument will have a half wave plate and beamsplitter, rather than a rotating polaroid, to increase sensitivity. The Multicolor OPTimised Optical Polarimeter (MOPTOP) will measure the polarisation of light from variable and transient objects in three standard wavebands simultaneously. I will present the MOPTOP instrument and discuss its progress, along with the science applications.

Classification of young stellar objects among GAIA alert candidates

Jozsef Varga
Konkoly Observatory

We aim to develop an automatic classification scheme to identify young stellar objects (YSOs) in the GAIA Alerts database. Identifying YSOs may lead to valuable follow-up observations. Currently we are experimenting with algorithms like principal component analysis and artificial neural networks. Our main difficulty is to find an appropriate, homogeneous representation for the GAIA lightcurves.

Gaia Photometric Science Alerts for Variable Young Stellar Objects

Varga-Verebélyi Erika
Konkoly Observatory

Transients near the centers of the galaxies

Rupak Roy
Inter-University Center for Astronomy and Astrophysics (IUCAA)

Recently the "time domain astronomy" has found several new kinds of transients very near to the centers of the galaxies. Most of them are much brighter than canonical supernovae and exhibit very broad lightcurves with almost featureless spectra. These are Tidal Disruption Events (TDE) which are probably produced due to complete disruption of massive stars by the supermassive black hole (SMBH) at the center of their hosts. Certainly the proposed mechanism for TDEs is completely different from that of canonical core-collapse supernovae (CCSNe) and also different from that of Superluminous Supernovae (SLSNe) which are supposed to be either powered by shock-interaction or pair-instability processes or by a spin-down magnetar. The intermediate Palomar Transient Factory (iPTF) survey has discovered a transient which occurred very near to the center of its host and exhibits photometric and spectroscopic properties some-extent similar to both TDEs and CCSNe. It is also more energetic than canonical CCSNe. Certainly investigation for disruption mechanism and progenitor scenario of such event is non-trivial. Worth to mention that star formations near the centers of the galaxies and hence the natures of the associated transients are also not well known. Here, I shall briefly describe different possible disruptive phenomena that can occur at the centers of the galaxies and what we can learn from the new iPTF discovery. I shall also discuss about the role of Gaia to catch such transients at their early stages and the importance of Gaia-alert system to conduct multi-band observations in future under coordination with other Space-based and Ground-based follow-up facilities.

Nuclear transients from OGLE

Aleksandra Hamanowicz
European Southern Observatory

In my talk I describe the project in which we systematically searched for nuclear transients in OGLE and Gaia surveys in real-time and archival data. In real-time we investigated in detail about 20 transients, for which we obtained classification spectroscopy on the largest telescopes in the world (SALT, VLT, NTT, NOT). In the archival 6-years long photometric data from OGLE we found supernovae, AGN variability and TDE candidates. We also have identified long-lasting transients which light curve shapes, that do not match any of known types of transients.

Nuclear transients from Gaia

Mariusz Gromadzki
Warsaw University, Astronomical Observatory

Transients occurring close to galactic nuclei are challenging to find and study but potentially yield a unique insight into the environment of supermassive black holes. We will present our systematic search for nuclear transients in the OGLE and Gaia Surveys, both in the archival and real-time data. We carefully investigated about 20 unusual transients out of hundreds detected. Among discovered objects, we found some TDE candidates (OGLE16aaa, OGLE17aaj, Gaia16aax) and a number of unusual nuclear supernovae, which could potentially mimic some of the Changing Look AGNs.

Searching for fast Gaia transients

Thomas Wevers
Institute of Astronomy, Cambridge

The ESA Gaia satellite scans the whole sky with a temporal sampling ranging from seconds and hours to months. Each time a source passes within the Gaia field of view, it moves over 10 CCDs in 45 s and a lightcurve with 4.5 s sampling (the crossing time per CCD) is registered. Given that the 4.5 s sampling represents a virtually unexplored parameter space in optical time domain astronomy, this data set potentially provides a unique opportunity to open up the fast transient sky. We present a method to start mining the wealth of information in the per CCD Gaia data and the first preliminary results of a 23 square degree search.

ASASSN-17gs – awakening of a dormant blazar by a tidal disruption event?

Kirill Sokolovsky
National Observatory of Athens

ASASSN-17gs is an extragalactic transient of uncertain nature detected in GeV gamma rays (Fermi LAT), X-rays (Swift, MAXI) and optical bands near the center of the galaxy 2MASX J15441967-0649156. Swift observed ASASSN-17gs for 30ks between 2017-05-26 and 2017-09-28. Swift/XRT detected a bright and variable X-ray source with the average net count rate of 1.0 cts/s at the position of the transient. No decline in UV and X-ray emission was observed until the source became Sun-constrained for Swift. The observed properties of ASASSN-17gs resemble a blazar. It is surprising that such a bright blazar was not identified before and may suggest that the current level of activity is exceptional for this source. Could this blazar-like activity be triggered by a tidal disruption event?

Optical follow-up observations of Fermi LAT blazars

Tapio Pursimo
Nordic Optical Telescope

I will present some multiwavelength results of Fermi LAT AGNs and discuss how Gaia would improve the science cases. Simultaneous observations with large frequency coverage are needed for accurate physical models of the blazar emission. In addition, as a staff astronomer at NOT, I will show the possibilities using NOT for the follow-up observations for the Gaia-community, the instrument suite and accessibility.

Black holes as microlenses in the Milky Way

Grzegorz Wiktorowicz
Warsaw University Astronomical Observatory

In spite of being rare in comparison to hydrogen-burning stars, black holes are a promising population of gravitational microlenses. Realistic estimates predict tens of millions of black holes in our Galaxy. This population can be characterised with the use of evolutionary simulations of massive binaries and single stars. I will present the predictions on the observable parameters on Milky Way-like population of black holes. The Gaia mission may provide data to validate these predictions.

Microensing events from Gaia

Katarzyna Kruszyńska
Warsaw University Astronomical Observatory

Ever since the first data has been acquired in 2014, Gaia has observed much more than that. Up to this day its alerting system of sudden change in brightness of observed sources (*AlertPipe*) has detected around 3000 transients. More than 30 of them have been classified as microlensing candidates from all over the sky, with a spectacular binary event in the Northern disk, Gaia16aye, among them.

Microlensing events detected and observed by Gaia offer a possibility for registering not only photometric effect, but also its astrometric counterpart. This will provide additional data, that will help to break degeneracies for single source-single lens events, which might lead to mass measurements of lenses and, in particular, to discovering lensing black holes.

I will present the best microlensing events that have been found by Gaia and which had additional data from the ground, including OGLE and telescopes within the OPTICON network. Additionally, for some of the events at least two spectra were obtained at different magnifications, in order to constrain the blending and the nature of the lens.

OPTICON and its role, results, current status, Calibration Server

Łukasz Wyrzykowski
Warsaw University, Astronomical Observatory

Calibration Server 2.0 beta

Zbyszek Kołaczkowski, Kris Rybicki, Paweł Zieliński
Warsaw University, Astronomical Observatory

Gaia Marshall demonstration part 1

Arancha Delgado
Institute of Astronomy, Cambridge

PIRATE and Gaia Alerts

Meredith Morrell
The Open University

A brief overview of the Gaia Alerts targets imaged by PIRATE recently.

Photometric measurements from Cracow Observatory - instruments, software and results

Sebastian Kurowski
Astronomical Observatory of the Jagiellonian University

Photometric observations in Cracow cover a wide range of astrophysical objects: eclipsing binaries, cataclysmic variables, quasars and even comets. Since the end of 2016 it has been extended by observations of gravitational microlensing events as our Observatory joined Gaia Science Photometric Alerts group. In this talk I will shortly describe optical instruments and image acquisition software currently used in Cracow Observatory. In particular, I will present JastroCam program that runs under Linux platform and is a powerful CCD data gathering tool.

PST2 - Poznań telescope in Arizona

Tadeusz Michałowski
Poznań Astronomical Observatory

Gaia alerts in Loiano

Felice Cusano
INAF- OABo

I will give an overview of the past and future observations of transient objects with the Loiano telescopes

Follow-up from Sicily

Ricardo Zanmar Sanchez
INAF-OACT

Greek telescopes

Emmy Paraskeva
IAASARS, National Observatory of Athens

Algita Stankevičiūtė

Algita Stankevičiūtė
Kaunas University of Technology

Observations of Gaia transients at the Terskol Observatory

Vira Godunova
ICAMER Observatory of NASU

Since 2015, scientific activities at the Terskol Observatory (the Northern Caucasus) have been aimed at optical follow-up of transients detected within the framework of the Gaia mission. A lot of stellar objects (SNe, CVs, YSOs, etc.) and asteroids were observed at the Terskol Observatory using the telescopes Zeiss-2000 and Zeiss-600. Two years of successful research have yielded new data and findings in this field. Photometric observations of Gaia transients allowed us to reveal physical characteristics of a good few of them. Furthermore, we confirmed positions of dozens of asteroids reported by GBOT and Gaia-FUN-SSO groups. The results obtained demonstrate that ground-based small and medium-sized telescopes remain a valuable tool for monitoring and investigation of newly detected objects.

Observational research at the Lisnyky observatory near Kyiv

Andrii Simon
Taras Shevchenko National University of Kyiv

We report the results of observational research at the Lisnyky observatory of the National University of Kyiv (IAU code 585). In 2015-2017, follow-up observations of various targets have been conducted, including Be/X-ray binaries, CVs, SNe, Gaia transients, GBOT asteroids, etc. In particular, Using spectral and photometrical datasets, which were obtained at Lisnyky (with a 70-cm Ritchey-Chretien telescope) and other observatories, we estimated distances to the Be/Xray binaries 1H1936+541 and 1H2202+501. A comparison with the Gaia DR1's values demonstrated a good agreement between our and Gaia's results. Furthermore, our activities in the field of observations of GBOT asteroids allowed us to confirm (to discover) three new asteroids (at G magnitude of about 20.5m).

Białków Observatory - indispensability of small ground-based telescopes in the era of satellite observations

Dawid Moździerski
University of Wrocław

We are living in the era of dynamic development of satellite observatories, and in the beginning of era of extremely large ground-based instruments. Observations carried out with those instruments are/will be more precise in many meanings of this word. But they are also very specialised. Small telescopes, even localized in not very good place, like our Białków Observatory, are more "flexible" and their observations complement satellite observations in many ways.

Hands-on with the new Marshall

Aranca Delgado
Institute of Astronomy, Cambridge

Hands-on with the old Calibration Server

Łukasz Wyrzykowski
Warsaw University, Astronomical Observatory
