

ABSTRACTS

4th Gaia Science Alerts Workshop
19-21 June 2013, IAP, Paris, France

ordered alphabetically by the title

A large, deep, and homogeneous sample of cataclysmic variables from GAIA

Dr Elme Breedt
University of Warwick

Cataclysmic variables (CVs) are the dominant population of compact interacting binaries, and their study is key to improve our understanding of accretion physics and the evolution of close binaries. Thanks to their highly variable and eruptive nature CVs are easily identified in time-domain surveys, and we expect GAIA to detect ~200 CVs per year. The fundamental advantage of the GAIA CV sample will be that it is based on a well-determined sampling and constant limiting magnitude, independent of weather effects, and hence selection effects can be accurately modelled. We are currently investigating the ~1000-strong CV population discovered by the Catalina Real-time Transient Survey (CRTS), which closely resembles GAIA in terms of limiting magnitude, duration, and total number of epochs. We will present highlights from study serves as a show case for the scientific potential of the CVs identified by GAIA. We will also discuss our plans to coordinate the follow-up efforts of GAIA alerts, which will include an online data base for the GAIA CVs, a network of astronomers with access to 2-4m telescopes for spectroscopic observations, and intense photometric time-series obtain as part of intense Pro-Am collaborations.

Automated Classification of Supernovae from Gaia Alerts

Dr Nicholas Walton
Institute of Astronomy, University of Cambridge, UK

Gaia is an ESA cornerstone mission set to revolutionise our understanding of the Milky Way. Gaia is scheduled for launch in September 2013, and is designed to map over one billion stars. This talk describes how science alerts from the ESA Gaia mission will be classified into various types. It focuses on the classification of those identified as supernova. We present our investigations into the use of a range of classification techniques, whereby we demonstrate the ability to discriminate between various Supernovae (SNe) sub types, based on the Gaia data (photometry and spectrophotometry) alone. In particular we comment on the potential ability of Gaia to rapidly estimate SNe Type Ia distances. The talk will introduce the current testbed visualisation platform for these SN alerts.

Connecting LOFAR radio, X-ray and optical GAIA transients

Dr Peter Jonker
SRON, Netherlands Institute for Space Research, The Netherlands

The study of transients with time scales of seconds to weeks are especially interesting for a) understanding supernova explosion via supernova shock break-out, and b) the study of dormant (intermediate-mass) black holes via tidal disruption events. I propose to use optical (GAIA) and radio (LOFAR) and where possible simultaneous X-ray observations to determine the event rates and properties of these various transients. I will briefly show an

example of a transient that fall in the category of these short-duration transients and I will discuss the possibility of LOFAR tracking GAIA as it scans the Northern Hemisphere.

Detection rate for variable stars

Dr Stephen Ridgway
NOAO, USA

The Kepler data release 13 has been used to determine the typical frequency of occurrence of variability as a function of variability amplitude for galactic stars. These results are used to estimate the rate at which variable targets will be discovered in the LSST and GAIA surveys.

Directed Follow-Up strategy - using Gaia Science Alerts to detect transiting Exoplanets

Prof. Shay Zucker
Tel Aviv University, Israel

Gaia's scanning law is far from being optimized to detect transiting extrasolar planets. In fact, under the prevailing paradigm, low-cadence data cannot be used for that purpose. Nevertheless, we show, through various simulations, that low-cadence data, especially those of Gaia, can be used to direct ground-based observations in a way that will allow such detection. We propose to implement the idea within the Science Alerts framework. This will allow a better exploitation of Gaia data. I will also show the importance of 'real-time' reaction to Gaia data, in order not to lose the phase information, which is crucial.

Discovery optical transients on MASTER robotic telescope network.

Dr Evgeny Gorovskoy
Sternberg Astronomical Institute of Lomonosov Moscow University, Russia

The main stages in the creation of the Russian segment of the MASTER network of robotic telescopes is described. This network is designed for studies of the prompt optical emission of gamma-ray bursts (GRBs; optical emission synchronous with the gamma-ray radiation) and surveys of the sky aimed at discovering uncataloged objects and photometric studies for various programs. The first results obtained by the network, during its construction and immediately after its completion in December 2010, are presented. Eighty-nine alert pointings at GRBs (in most cases, being the first ground telescopes to point at the GRBs) were made from September 2006 through July 2011. The MASTER network holds first place in the world in terms of the total number of first pointings, and currently more than half of first pointings at GRBs by ground telescopes are made by the MASTER network. Photometric light curves of GRB 091020, GRB 091127, GRB 100901A, GRB 100906A, GRB 10925A, GRB 110106A!, GRB 110422A, and GRB 110530A are presented. It is especially important that prompt emission was observed for GRB 100901A and GRB 100906A, and that GRB 091127, GRB 110422A, and GRB 110106A were observed from the first seconds in two polarizations. Very-wide-field cameras carried out synchronous observations of the prompt emission of GRB 081102, GRB 081130B, GRB 090305B, GRB 090320B, GRB 090328, and GRB 090424. Discoveries of Type Ia supernovae are ongoing (among them the brightest supernova in 2009): 2008gy, 2009nr, 2010V, and others. In all, photometry of 387 supernovae has been carried out, 43 of which were either discovered or first observed with MASTER telescopes; more than half of these are Type Ia supernovae. Photometric studies of the open clusters NGC 7129 and NGC

7142 have been conducted, leading to the discovery of 38 variable stars. More than 200 optical transients have been discovered.

EduCosmos: Participative science for high school students with 1m telescopes

Dr Olga Suarez
Observatoire de la Cote d'Azur, Nice, France

EduCosmos is a project that will allow high- and medium-school students to participate in scientific research. Researchers from the Observatoire de la Côte d'Azur (Nice, France) propose scientific projects that need observations with the two 1-meter telescopes belonging to the Observatoire, located at the Plateau de Calern (alt. 1280m), 70 km away from Nice. The students, guided by their teachers and by the EduCosmos team, will perform the observations remotely. Teachers are formed in agreement with the local education authorities to be able to understand the scientific project, perform the observations and reduce the data. Students will be formed by their teachers and will have the support of the EduCosmos scientific team to be able to conduct successfully the observations and to understand their participation in the scientific program. When the GAIA-FUN alerts happen during the time allocated to students, they will participate also to the network observations.

GAIA alerts on AGN flares: which synergy with observations at Very High Energies ?

Dr Helene Sol
CNRS, Observatoire de Paris, France

It could be interesting to release GAIA alerts on AGN, at least for the ones already seen in the TeV gamma-ray range by ground-based Cherenkov telescopes. This would allow follow-up observations at very high energies during probable states of high activity of the sources, which optimizes the possibility of deep analysis of gamma-ray spectra and light curves (and line of sight effects). At the moment, there are mostly three Cherenkov arrays operating at TeV energies (H.E.S.S., MAGIC and Veritas). The next generation very large array "CTA" (with several tens of gamma telescopes covering the spectral range from a few tens of GeV to 100 TeV) is now in preparation and should start partial operations during the GAIA operating time.

Gaia RVS spectra as follow-up to Photo Science Alerts

Dr George Seabroke
Mullard Space Science Laboratory (MSSL)

Spectro Science Alerts (SSA) will ultimately generate Gaia Science Alerts based only on RVS spectra. In addition to this, RVS spectra can be provided as a follow-up to Photo Science Alerts and I will present how we plan to do this.

Gaia status

Dr. Timo Prusti
ESA

The status of the Gaia mission will be presented.

Konkoly Observatory - Observing Facilities and Photometric Projects

Prof Laszlo Szabados

Konkoly Observatory, Hungarian Academy of Sciences, Hungary

The facilities at the Piszkesteto Mountain Station of the Konkoly Observatory of the Hungarian Academy of Sciences are introduced. In addition, some interesting results on transient phenomena and those of long-term monitoring of variable stars are also mentioned.

New Measures for Different Transients

Dr Ashish Mahabal

Caltech, USA

Observations of PHA 99942 Apophis at RTT150 in frame of Gaia-FUN-SSO.

Dr Irek Khamitov

TÜBİTAK National Observatory, Turkey

Abstract. Optical observations of Apophis in it last approach were performed at 1.5m Russian-Turkish telescope RTT150 during four nights - Jan 22, Feb 18, 20, and March 13, 2013 in the frame of world-wide campaign of Gaia-FUN-SSO network. A series of BVRI images were obtained in every night besides March 13 when series of VRI images were obtained. Spectroscopic observations were performed in Feb 20 with resolution $R \sim 600$ covered whole visual range from 4000 Å to 9000 Å. The errors of mean spectrum are better than 10% on whole range. There is evident drift in (O-C) between RTT150 observations and ephemerides calculated by using tools at IMCCE web-site. We estimate the accuracy of RTT150 observations as 0.1 arcsec.

Observing with the Faulkes Telescopes

Dr Fraser Lewis

Faulkes Telescope Project, University of South Wales

The Faulkes Telescope Project has two 2-metre optical telescopes based at Haleakala on Maui and Siding Spring in Australia. We provide free access to UK schools and other educational groups and provide our users with interesting targets, many of which are chosen in collaboration with researchers. I will discuss a broad range of targets that we currently observe as well as explaining how the telescopes are part of a broader network of telescopes under Las Cumbres Observatory Global Telescope (LCOGT).

Optical searches for stellar tidal disruption flares

Mr Sjoert van Velzen

Radboud University Nijmegen, The Netherlands

Stars that wander too close to the center of their galaxy are shredded by the tidal force of the central supermassive black hole. The accretion of the stellar debris produces a flare of thermal radiation, which peaks at optical/UV wavelengths. These stellar tidal disruption flares are an unique probe of otherwise dormant black holes. I'll review the current status of optical searches for tidal disruptions and highlight the potential of using Gaia as a trigger to find these events.

OPTICON, the Plans for FP7: 2013-2016

Dr John Davies
UKATC, Royal Observatory, Edinburgh, UK

I will summarise the OPTICON project for general information, highlighting the telescope access programme and the opportunities for using OPTICON funds for co-ordinating small and robotic telescopes across Europe

PESSTO: The Public ESO Spectroscopic Survey for Transient Objects

Dr Mark Sullivan
University of Southampton, UK

Science with PIRATE (POSTER)

Dr Ulrich Kolb
The Open University, UK

Presentation of the 2012 PIRATE observing campaign.

Solar System alerts

Dr Paolo Tanga
Observatoire de la Côte d'Azur, France

South African Astronomy and Observatories

Dr Stephen Potter
South African Astronomical Observatory, South Africa

I will outline the current and near future status of South Africa's optical and radio observatories.

Spectroscopic science alerts: criteria and implementation

Dr Paola Di Matteo
Observatoire de Paris, France

I will present the current status of the SSA, the criteria we chose to define SSA alerts, how we plan to implement the alerts in the daily pipeline and the publication planning.

Detection and classification in the AlertPipe

Dr Lukasz Wyrzykowski
Warsaw University Astronomical Observatory, Poland /IoA, Cambridge, UK

How it is going to work.

AlertPipe Status

Dr Simon Hodgkin
Institute of Astronomy, University of Cambridge, UK

The Asiago facilities

Prof Massimo Turatto
Osservatorio Astronomico di Padova, Italy

The C2PU (Centre Pedagogy Planet Univers) at OCA (Observatoire de la Côte d Azur) in the framework of GAIA-FUN

Prof Phillippe Bendjoya
UNS-OCA-CNRS, France

We describe the facilities of a 1m telescope in the Southern of France that has been fully refurbished and that is well suited to the GAIA-FUN. We present the C2PU project : telescope, instruments and philosophy. A twin 1m telescope will be available at the end of 2014.

The Fly's Eye camera system

Dr Krisztian Vida
MTA CSFK CSI, Hungary

The "Fly's Eye" camera system is a proposed high resolution all-sky monitoring device intended to perform high cadence time domain astronomy in multiple optical passbands while still accomplish a high étendue. In July 2012, fundings has been accepted by the Hungarian Academy of Sciences in order to design and build a "Fly's Eye" device unit. Beyond the technical details and the actual scientific goals, we also demonstrate the possibilities and yields of a possible network operation involving approximately a dozen of sites distributed geographically in a nearly homogeneous manner.

The photometric observations of Gaia alerts with 60cm ASV telescope

Dr Goran Damljanovic
Belgrade Astronomical Observatory, Serbia

During this year it is planing to start the European space astrometry Gaia mission (ESA). One of the tasks is to observe about 500000 extragalactic radio sources (ERS or QSOs) and to align the Gaia and VLBI frames (via QSOs which are bright at optical domain). Because of it, at 2011 we started with observations of QSOs (from ICRF2 list) at optical wavelength by using the 60cm ASV (Astronomical Station Vidojevica, Serbia) and 2m Rozhen (Bulgaria) telescopes. At the 60cm ASV instrument it is the CCD Apogee Alta U42 (2048x2048 pixels,

the pixel size is 13.5x13.5 mkm, the scale is 0.46"/pixel) and at 2m Rozhen it is VersArray 1300B (1340x1300, 20x20 mkm, 0.26"/pixel). By using the 60cm ASV telescope we plan to join the follow-up network for the Gaia photometric alerts, and maybe with 2m Rozhen one, also. Some possibilities and results of mentioned instruments are presented, here.

The pt5m robotic telescope on La Palma (POSTER)

Dr Stuart Littlefair
University of Sheffield, UK

I present an overview of the capabilities of, and science results from, the pt5m 50cm robotic telescope on La Palma.

The use of Danish 154 Telescope and DFOSC photometer to follow up the objects from Gaia Alerts project

Dr Pavel Koubsky
Astronomical Institute, Ondrejov Observatory, Czech Republic

A brief summary of the UBVRI photometry obtained with the DK154/DFOSC instrumentation and the prospects for the Gaia Alerts follow-up will be given.

Time Domain Astronomy with the Liverpool Telescope

Dr Chris Davis

Liverpool Telescope/Liverpool JMU, UK

We will briefly describe the 2-metre Liverpool Telescope, its autonomous mode of operation, and its suite of instruments. The LT is one of the world's premier robotic observatories: it is capable of responding to triggers from GAIA within hours or even minutes, if necessary, and is well suited to follow-up observations on the types of variable sources, transients, and outbursts that are likely to be uncovered by GAIA.

Transient astronomy with the observing facilities of the Vienna Observatory

Prof. Werner Zeilinger

University of Vienna, Austria

A status report of the 1.5m and 0.8m telescope facilities of the Vienna Observatory is given regarding instrumentation upgrades and automated data reduction pipelines. Results from test observations of various types of transients are presented.

Upcoming Microlensing by Proxima Centauri: A Rare Opportunity for Mass Determination and Planet Detection

Dr Kailash Sahu

Space Telescope Science Institute, USA

Proxima Centauri will pass close to two background stars in 2014 and 2016, with impact parameters of about 1.6 and 0.5 arc seconds. Because Proxima is so nearby, its angular Einstein ring radius is large (~ 28 milli arc sec) and will lead to detectable relativistic deflections of the images of the background stars even at those angular separations. Measurement of the astrometric shifts offers a unique opportunity for an accurate determination of the mass of Proxima. Although the background stars are >8.5 mag fainter than Proxima, the large contrast is mitigated by the relatively large separations at which the gravitational deflection is still detectable, and should be detectable with GAIA. The upcoming events also offer the opportunity to detect and determine the masses of planetary companions, either through additional astrometric shifts, or in rare circumstances through a photometric microlensing event, leading to a brightening of the source star. These events would have durations of a few hours to several days.

Wroclaw Observatory

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