Workshop outlines

Workshop 1 - Radio transients in the era of multi-messenger astrophysics

Gemma Anderson, Kirill Sokolovsky
Monday 13 November 2017 from 14:00 to 17:30
Auditorium 1+2

Radio emission from astrophysical transients allows calorimetry of kinetic feedback and detailed imaging in ways impossible at other wavelengths, and as such forms an important part of the multi-messenger follow up to such events. The field is booming, with a renaissance of interest in accretion, stellar explosions and jetted supernovae, alongside newer classes of phenomena such as Fast Radio Bursts and Tidal Disruption Events. In this two-part workshop we will focus on the science surrounding radio transients (Part 1) and the infrastructure and techniques for detecting, identifying and probing radio transients (Part 2). Part 1 will specifically focus on the different types of radio transients, the science that can be obtained from studying these objects, and the methods used to probe this science, such as multi-messenger follow-up, VLBI, and rapid-response triggering. We will also explore the types of radio transient counterparts expected from multi-messenger events. Part 2 will expand further on the multi-messenger facilities and the types of transients alerts they will broadcast. This will be followed by a discussion on methods for following these transients, such as rapid-response triggering and shadowing. We will then discuss how we can move towards standardising the alert and triggering infrastructure and techniques, such as the use of VOEvents and software like the Comet VOEvents Client and the 4 Pi Sky VOEvent Broker.

Workshop 2 - Stellar variability: From citizen science to citizen astronomy

Stella Kafka
Monday 13 November 2017 from 14:00 to 15:30
Manor House

The contribution of citizens in research is irrefutable. Especially this century with the outburst of all-sky surveys, professional astronomers use citizen science projects to engage the public in analyzing and sorting large quantities of data leading to noteworthy discoveries. From crowdsourcing to acquiring data, citizens are leaving a notable mark in the science landscape, assisting professional astronomers with their work. In turn, citizen science is used to increase science literacy and public understanding of science. At the same time, the time domain enables a more active engagement of backyard observers in research. Citizen astronomers not only take data, but also reduce and analyze them and participate in scientific manuscripts.

This workshop aims to discuss different aspects of citizen science in astronomy, what resources currently exist for citizen astronomers, and how we can build a stronger international community of non-professional and professional astronomers who work towards understanding the variable universe.

Workshop 3 - Get ready for TESS: an on-hand software tutorial

Jennifer Burt, Thomas Barclay
Monday 13 November 2017 from 14:00 to 15:30
Breakout venue 1+2

While surveying the southern sky during the first year of its prime mission, NASA's TESS spacecraft will provide opportunities for a large range of transient science cases: exoplanet transits, detection of super novae, searching for gravitational wave optical counterparts, etc. In this workshop, we will give attendees an overview of TESS science possibilities in the southern hemisphere, and lead them through an interactive demonstration of how to access and work with TESS data. We will also describe the TESS guest observer program and the followup community platform ExoFOP-TESS, and detail ways for astronomers around the globe to get involved with the many areas of TESS science.

Workshop 4 - 25 Years of the southern skies monitoring with OGLE

Lukasz Wyrzykowski, Pawel Pietrukowicz
Monday 13 November 2017 from 16:00 - 17:30
Manor House

Optical Gravitational Lensing Experiment (OGLE) started in 1992 in Las Campanas Observatory with a pilot monitoring programme of two million stars in the Galactic Bulge. It operates until today, collecting time-domain photometric data of a billion stars from the densest regions of the Southern sky. Among its main achievements are discoveries of thousands of microlensing events, with a few dozens of extrasolar planets and candidates for black holes, a million of variable stars, thousand quasars and supernovae. It has had a major contribution to the studies of dark matter content of the Milky Way halo, structure of the Galactic Bulge, Magellanic Clouds and new classes of variable stars.

We hope that the workshop will be a good opportunity to discuss OGLE achievements in the past as well as to discuss the future of the project in the context of the current and new large sky surveys.

Workshop 5 - A-type stars as a unique challenge in time-domain studies

Gautier Mathys
Monday 13 November 2017 from 16:00 - 17:30
Breakout venue 1+2

The A-type stars are unique among main-sequence stars in that they show periodic variations on timescales ranging from minutes to centuries. Those variations are caused by different physical processes, including pulsation, rotation and multiplicity, and they manifest themselves through various observables, including photometric brightness, spectral line strength and shape, radial velocity, and magnetic field strength and orientation. The resulting diversity in both the timescales over which the variability of those stars needs to be followed and characterised and the diagnostics and techniques to be used to that effect makes the A-type stars particularly well suited to illustrate a wide range of challenges tor time-domain astronomy. The goals of the proposed workshop are to identify the differences, commonalities, and complementarities of the various aspects of the study of periodic variability of A-type stars, both among themselves and with respect to similar or related studies of other types of astronomical objects, and on that basis, to explore the possibilities for improvement of the strategies to be used in the future for such studies.

Workshop 6 - X-ray binaries in the Magellanic Clouds and the Milky Way

Phil Charles
Tuesday 14 November 2017 from 14:00 - 15:30
Auditorium 1+2

There has been considerable work done in the last decade using all the SAAO telescopes in conjunction with X-ray observatories to study the binary compact-object population. In the Magellanic Clouds this has focussed on the High-Mass X-ray Binary (HMXB) transients, all of which have proved to be neutron star systems (via their X-ray pulsations), and the more enigmatic SuperSoft Sources (SSS) which are believed to be Eddington-accreting white dwarf binaries, although this has still to be confirmed. In the Milky Way, the majority of X-ray transients are black-hole systems, providing the only environment in which their fundamental properties can be directly measured. X-ray transients thus open new avenues for studying accretion onto compact objects, investigating their population properties and the impact of metallicity on binary stellar evolution. In the future, all of these systems will be accessible in the radio to MeerKAT and SKA.

Workshop 7 - Towards Science with LSST: Data Products and Communications

Melissa Graham
Tuesday 14 November 2017 from 14:00 - 15:30
Manor house

This workshop aims to bring together the international community in a discussion about LSST, with the goal of moving all participants further towards answering the question of "How will I do my science with LSST data?" The planned pipelines and products of the data management team will be presented, with plenty of time for questions. We will also cover the existing channels for communication within the science community, and between the community and LSST Project's Data Management team. Participants will leave the workshop empowered to continue on their path towards science with LSST.

Workshop 8 - Supernovae

Max Stritzinger, Takashi Moriya
Tuesday 14 November 2017 from 16:00 - 17:30
Auditorium 1+2

Over the past decade non-targeted transient surveys have revealed the existence of a multitude of transients previously unknown. The workshop will cover recent advancements in our understanding of these new supernova classes. In addition we will discuss the need for future high-redshift transient surveys and possible modifications to the current IAU criteria for official supernova designations.

Workshop 9 - The multi-dimensional power of listening to your data

Jeffrey Cooke, Wanda Merced Diaz
Tuesday 14 November 2017 from 16:00 - 17:30
Manor House

Data is often analysed using plots to search for trends, relationships, or to carve out areas of interest. Sometimes we venture to 3-D plots to help study inter-relationships or analyse multiple parameters, but these plots can be bulky and they benefit from animation and rotation. Analysing 5, 10 or more parameters per data point becomes unwieldy on 2-D and 3-D plots, while it takes time and effort to make sense of different symbols, symbols sizes, colours, etc. Moreover, in the era of big data and fast analysis, conventional visual capabilities alone can hinder progress. We will discuss how sonification (converting data into sound) can help overcome some of these limitations and venture into new ways to analyse data. We will discuss ideas in this field by starting with our group's research into conveying multiple parameters in a single note, using 3-D spatial localisation to help select objects or populations of interest (including combining with virtual reality headsets), and exploiting the unique capability of humans to “pick a familiar voice out of a crowd” to identify objects of interest in a sea of “noise”. We will hear from blind astronomers on their experiences and challenges. Finally, we explore how full multi-sensory data analysis methods have good prospects for tackling the challenges of the future and how they will enable those passionate about science with visual and other impairments to excel at research.

Workshop 10 - New instrumentation for transient follow-up

Christina Thöne, Antonio de Ugarte Postigo
Tuesday 14 November 2017 from 16:00 - 17:30
Breakout venue 1+2

Wide-angle surveys in different wavelengths provide triggers for very different kinds of transients. It is crucial to have the right instrumentation, telescopes and observing modes to follow-up and characterize the newly discovered transients. Transient follow-up has its own specific challenges with fast reaction times, high time resolution observations for fast varying transients or large FoV combined with high sensitivity to follow-up triggers with large error boxes such as GWs and neutrinos. In this workshop we want to invite people to present future planned instruments and efforts for transient follow-ups and the challenges they face for different wavelengths/transients/triggers. A substantial part of the workshop will be a general discussion on what are the most important features needed for successful transient follow-up in the future.

Workshop 11 - Nuclear transients

Seppo Matilla
Thursday 16 November 2017 from 14:00 - 17:30
Auditorium 1+2

This workshop covers recent progress in studies of supernovae (SNe), tidal disruption events (TDEs) and other types of luminous transients occurring within the nuclear regions of galaxies. In the past such transients were missed due to large extinctions and contrast issues against the bright and often complex nuclear background or overlooked as ordinary AGN activity. However, improvements in difference imaging and machine learning techniques now allow recovering significant numbers of nuclear transients in ground-based seeing-limited searches at optical wavelengths. In addition, high spatial resolution infrared and radio observations enable studies of transients within the highly obscured nuclear regions of nearby luminous infrared galaxies.

Workshop 12 - Accessing data for long term variability

Elizabeth Griffin
Thursday 16 November 2017 from 14:00 - 15:30
Manor House

Variability occurs over an immense range of time-scales. Many we do not yet know about, though a proportion of those that are short in relation to our working schedules are getting to be known (and possibly understood). The latter can be extracted from observations in astronomy's electronic archives, but a great deal of valuable (and sometimes crucial) science can only be extracted by accessing data from much longer ago, primarily from photographic observations. Efforts have been made, though not yet in any concerted fashion, to access some of those historical data, and to convert them into modern electronic formats in the public domain. This Workshop will seek a summary of what is being attempted or has been accomplished, and discuss what can be done and how to fund it. All are welcome to attend, and if possible to bring relevant information regarding their local plate archive (if any).

Workshop 11 - Astroinformatics and machine learning

Michelle Lochner, Bruce Bassett
Thursday 16 November 2017 from 14:00 - 15:30
Manor House

The workshop will consist of two parts:

(1) An introductory session: "Everything you wanted to know about machine learning and astroinformatics but were afraid to ask"

(2) In the 2nd session we will discuss the future of machine learning in transient astronomy and in particular how observatories and the community can maximise gains from machine intelligence

Workshop 14 - Calibration and standardization

Christiaan Sterken
Thursday 16 November 2017 from 16:00 - 17:30
Breakout venue 1+2

One of the great challenges in Time Domain Astronomy is the problem of merging and combining data obtained at various epochs with very different instruments. In practice, these problems are tackled from within a specific observational modus, e.g. photometry, spectroscopy, etc.

This workshop will discuss various problems and pitfalls of time-domain calibration by covering calibration and standardization techniques across different disciplines.

The following topics will be dealt with:
- detector linearity
- detector resolution
- detector saturation
- flatfielding
- data reduction techniques
- data analysis
- decorrelation
- standard systems
- etc.