'UK astronomy at the La Palma observatory: a new generation of facilities and instruments (UKLaPalma)' Abstracts

Talks

The Digital Telescope Prototype

Authors

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Abstract

The Digital Telescope is a new all-sky survey designed to image the entire visible sky from a given location at sub-second cadence. The primary goal of the DT is to catch the earliest phases of transient phenomena in real time over an extremely wide field. The full instrument consists of a stationary array of 850 8-inch telescopes each with a sCMOS camera. Tracking is performed in software and images are stacked to reach the desired precision for targets as a function of their apparent magnitude. Our simulations show that stacking low-read noise images achieves limiting magnitudes (SNR=5) of V=16.2 and V=19.2 in 1 and 60 seconds, respectively. Deeper imaging is possible by stacking further. The DT concept is also ideal for SDA applications. Satellite tracking simply requires stacking images along a TLE vector rather than a sidereal vector. Warwick has also developed a bespoke blind-stacking technique for detecting untracked satellites and debris.
A 52 telescope prototype system has been funded through an Advanced ERC/UKRI grant (PI: Pollacco). In 2026/27 we will deploy the prototype on La Palma with the goal of derisking the full DT concept. We will validate the hardware/software designs, demonstrate on-sky performances and our capability of detecting transient phenomena during the earliest phases of their evolution using our real-time pipeline. In this talk I will present the current status of the DT prototype.

Pathway to First light of HARPS3 at the Isaac Newton Telescope (Invited)

Authors

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Abstract

The High Accuracy Radial velocity Planet Searcher 3 (HARPS3), is a stabilised, high-resolution spectrograph designed and built to undertake the Terra Hunting Experiment – a 10-year survey to collect nightly observations of the brightest solar-like stars in an endeavour to detect low-mass, long-period exoplanets akin to our own Earth.

HARPS3 is being installed and commissioned on the newly roboticised 2.54 m Isaac Newton Telescope (INT) in La Palma with first light now expected in late 2026/2027. We present a general system description and the status of the instrument commissioning. We also provide an update on the current issue with the detector unit, and the path we are following to bring the instrument to on-sky verification and nominal operation.

First results from the WEAVE Cluster Survey: galaxy environments from cluster cores to cosmic web

Authors

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Abstract

The first complete cluster from the WEAVE Wide Field Cluster Survey reveals galaxy environments on an unprecedented scale. Designed to uncover how environment drives galaxy evolution, the survey targets ~16 galaxy clusters, obtaining spectroscopy out to 5R_{200} (r < 19.75) and probing larger scales and greater depth than previously possible.

Abell 2626 is the first system to be fully observed, adding ~3,000 galaxy spectra—including ~350 confirmed cluster members—to the existing census. This expansive dataset exposes a rich and complex structure, tracing filaments, infall regions, and galaxy groups far beyond the cluster core. We further show that these observations uncover detailed structure not only within the cluster itself, but also in the foreground and background along the line of sight.

We map the large-scale structure surrounding the cluster out to 5R_{200}, directly tracing filaments, infall regions, and galaxy groups across the full environmental range from cluster core to cosmic web. This provides a new window into the connection between large-scale structure and galaxy evolution across a wide range of environments.

Enabled by the power of WEAVE, these results represent a significant step toward linking galaxy properties to their broader cosmological context. Abell 2626 is the first of ~16 galaxy clusters that will enable a statistically powerful view of environment-driven galaxy evolution, demonstrating the transformative potential of next-generation spectroscopic instruments such as WEAVE.

Enabling Time Domain Astronomy on La Palma with GOTO

Authors

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Abstract

The Gravitational-wave Optical Transient Observer (GOTO) is an automated transient discovery and time-domain survey facility that is deeply integrated with a range of facilities at the ORM, the site of its northern hemisphere node.

In the five years since the deployment of GOTO-N, the rate of discovery has increased dramatically, with more than half of its 5000 transient discoveries being made over the last year. Our discoveries are only as useful as follow-up observations allow, so significant efforts have been made to exploit the GOTO discovery stream as effectively as possible, primarily with other facilities at the ORM. This has included visitor-mode spectroscopic observations at the INT and NOT under the GOTO-FAST programme, as well as fully automated discovery, triggering, and follow-up with the LT using the GOTO Auto-Trigger (GOAT) system. These efforts have primarily been driven by the behaviour of rapidly evolving transients like GRB afterglows, infant supernovae, and LFBOTs which require low-latency, coordinated observations between telescopes across the whole range of apertures, instruments, and wavelengths to fully capture.

Now, in the gap between LVK O4 and IR1, we have the opportunity to explore these possibilities further, with more GOTO array time available for dedicated surveys and an increasing number of facilities coming online (e.g. WEAVE) or providing rapid response modes (e.g. NOT).

This talk will provide an update on the current status of and future plans for GOTO, detail our newly developed hot-cold survey strategy, review our successful follow-up programmes at the ORM, and highlight how GOTO can be integrated into additional facilities to enable world-leading time domain science.

From WEAVE to HARPS3 and beyond: The ING as a Global Spectroscopic Survey Facility for the Next Decade

Authors

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Abstract

The Isaac Newton Group of Telescopes (ING) at the Observatorio del Roque de los Muchachos occupies a unique and strategically important position in the Northern Hemisphere astronomy landscape. Through the 4.2m William Herschel Telescope (WHT) and the 2.5m Isaac Newton Telescope (INT), the ING now delivers world leading spectroscopic survey capabilities, firmly establishing La Palma as one of the premier sites globally for large scale spectroscopic science.

WEAVE on the WHT is now conducting transformational surveys spanning stellar evolution, Galactic archaeology and galaxy evolution, while HARPS3 on the INT will soon begin a dedicated ten year programme to detect Earth-mass planets around Sun-like stars through high-precision radial velocity measurements. Together, these facilities position the ING as a cornerstone of Northern Hemisphere spectroscopic survey science, with the added distinction of remaining the only STFC managed astronomical observatory worldwide. Importantly, both WEAVE and HARPS3 dedicate a substantial fraction of observing time to PI led programmes, delivered through efficient queue scheduled operations alongside the major surveys.

Looking beyond current programmes, this contribution will present the evolving scientific and technical vision for the ING over the coming decade. This includes its expanding role in time domain and transient astronomy, as well as its function as a testbed for emerging technologies such as AI assisted operations, autonomous scheduling, and novel instrumentation.

Finally, we will emphasise the unique training environment provided by the ING for early career researchers and engineers. By offering hands on experience across instrumentation development, observatory operations, software, survey execution and data exploitation, the ING provides a depth and breadth of training opportunities unmatched elsewhere in the UK astronomy ecosystem.

On-sky rapid prototyping of the Squash spectrograph

Authors

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Abstract

Squash is a new flagship spectrograph being developed in Liverpool for rapid classification of Galactic and extragalactic transient events. It forms part of a next generation instrumentation suite, building on that of the Liverpool Telescope (LT), with a focus on low-cost, reliable instruments that are easily maintained. The LT is an autonomous telescope with limited need for human access; facilities like this require no-fuss instrumentation. The new instruments will be co-mounted at the telescope Cassegrain focus, as with all operational instruments on the LT.

The current instrument suite includes SPRAT, the SPectrograph for the Rapid Acquisition of Transients. Over the past decade this instrument has proven reliable, but it requires regular maintenance, which is not ideal for a remote facility. Removing moving parts would reduce maintenance requirements and improve operational robustness. To build on this workhorse instrument, we have completed research and development for a low-resolution, R~450 (15 Å), long-slit, 1.6 arcsec, 3750–7500 Å spectrograph with no moving parts. The novel design uses a dual-camera system with a beam-sampler to split the light between dedicated acquisition and science cameras.

One of our aims for the Squash spectrograph is a generic design suitable for many 2-4 m class telescopes. Similar to previous LT instrumentation, we have used rapid prototyping techniques for the design and testing of Squash and present the results from testing a 3D-printed prototype in the lab and on the Liverpool Telescope. This work describes the range of beam-splitters tested, issues with using LEDs as artificial stars, and throughput measurements in the lab and on sky.

Posters

A dual-site perspective on UK astronomy in the Canary Islands: the role of Teide Observatory

Authors

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Abstract

The Canary Islands host two of the best astronomical sites in the Northern Hemisphere, with the Observatorio del Roque de los Muchachos and the Observatorio del Teide providing complementary observing capabilities from geographically proximate, high-altitude locations. In this contribution I highlight Tenerife-based facilities as a key component of UK-access infrastructure across the archipelago.

In particular, the QUIJOTE experiment provides wide-area surveys at 10–40 GHz, with recent data releases from its Multi-Frequency Instrument enabling studies of Galactic emission on large angular scales. This programme builds on a long heritage of radio and microwave experiments at Tenerife. Ongoing and upcoming experiments, including GroundBIRD and LSPE-STRIP, will extend this frequency coverage to higher frequencies and improved sensitivity.

I will describe the UK contributions to these experiments and outline how combined use of facilities on Tenerife and La Palma enhances the overall capability available to UK astronomers, particularly through multiwavelength coverage and shared access to world-class observing sites.

Light Curve and Phase Curve Analysis of Selected Asteroids from Serendipitous Observations

Authors

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Abstract

Asteroids hold a rich history of the building blocks of the Solar System. Their physical properties such as the orbital period, spin state orientation, surface and chemical composition, can provide vital clues about the formation and the evolution of our planetary system. Research studies suggests that asteroids could also provide key insights into the origin of life on Earth. However, they also pose threat to life on Earth through potentially catastrophic impacts. For this matter, their study is also essential for the survival of the human race through planetary defence mechanisms. Due to their relatively small sizes, in-situ studies with spacecrafts provide the most detailed information but due to the cost very few have been visited directly thus far. For this reason, unresolved and remote telescope observations continue to be the primary method for studying the majority of asteroids. Physical properties of asteroids can be studied from ground-based photometric observations through light curve analysis to determine their rotational period and phase curve analysis to determine their absolute magnitude. Targeted observations provide detailed temporal coverage but generally only one target is considered at a time. More than one asteroid can be observed in any part of the sky and instruments such as the Isaac Newton Telescope, Wide Field Camera (INT/WFC), with its large field of view providing numerous observations of additional asteroid targets. The INT data archive is publicly available and can be used to attempt light curve analysis on the secondary objects without using additional observation time. In this work, we present preliminary results of light curve analysis of several asteroids serendipitously observed with the INT/WFC from March 2022 to March 2023. We investigate their rotational properties, shape and size. Furthermore, by complementing the data set with long-term sky survey data from Zwicky Transient Facility (ZTF) and Asteroid Terrestrial-impact Last Alert System (ATLAS) surveys we outline the preliminary results of the phase curves of these asteroids to investigate their absolute magnitude and estimates their surface colours.