

STFC Update

Astronomy Community Meeting

Prof Grahame Blair Executive Director, Programmes

29 April 2024



STFC is a complex organisation

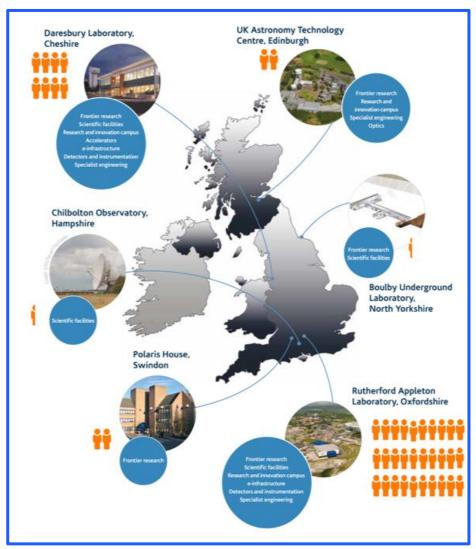
STFC's split personality:

- Science Funding: fundamental research in particle physics, astrophysics, nuclear physics and space science (inc. particle astrophysics)
- International Subs: managing relationships with major international research facilities (inc. CERN, ESO)
- Science Delivery: operating UK's major multidisciplinary research facilities and national laboratory capabilities (ATC, @RAL, Daresbury...)

Annual budget of ~£950m and 3,000 staff

- approximately 30% of all UKRI staff
- >85% of our staff are are scientists, engineers





STFC and Equity, Diversity and Inclusion

As a funder and scientific organisation, STFC is deeply committed to ED&I

- moral, ethical and legal imperative it is the right thing to do
- diverse organisations are more effective
- benefit (and benefit from) the widest (diverse) talent pool

Action on EDI is a key priority for UKRI & STFC:

- We published STFC's EDI action plan last year
 - Describes the rolling programme of multiple actions to improve:
 - EDI within STFC
 - Diversity in the people & things we fund
 - Diversity of the skill pipeline for the UK
 - Looking to our communities to help inform the continuous development of our plans



Recent initiatives

EDI will always be a top priority for STFC. We are committed to action

- Many recent STFC EDI activities include:
 - Development of a robust action plan on Bullying, Harassment & Discrimination
 - A second phase of the Reverse Mentoring scheme has started, which was opened to all under-represented groups
 - Provision of active bystander training session for all senior staff
 - Events to celebrate International Women Day and provide inspirational role models
 - We will be hosting 10+ black interns this summer as part of the national 10,000 Black Internship scheme
- We are recruiting a dedicated EDI lead for STFC:
 - providing dedicated professional support for our many EDI activities
 - steering the programme of our independent EDI Advisory Board
 - leading the next phase of development of our EDI action plan







People Update

UKRI Appointments

EPSRC Executive Chair

- Professor Charlotte Deane joined EPSRC in January
- Was Professor of Structural Bioinformatics at the University of Oxford and Chief Al Officer at Exscientia plc

NERC Executive Chair

- Professor Louise Heathwaite joined NERC in March
- Distinguished Professor in the Lancaster Environment Centre and Pro-Vice Chancellor Research and Enterprise at Lancaster University

BBSRC Executive Chair

- Professor Anne Ferguson-Smith will join BBSRC in July
- Pro-Vice-Chancellor for Research and International Partnerships, and Arthur Balfour Professor of Genetics at the University of Cambridge









STFC Executive Chair

STFC Executive Chair

- Mark Thomson was re-appointed as Executive Chair of STFC for a further nine months from 1 April 2024 to 31 December 2024
 - takes his term beyond the "normal" 6-year term
- The recruitment for Mark's successor is well underway



CERN DG

- the UK Government has announced support for Mark as the UK candidate for next Director-General of CERN
 - this is just the start of a long process...
- This nomination will have no impact on the importance Mark places in his day job of ensuring that STFC continues to develop as a world leading research and funding organisation.



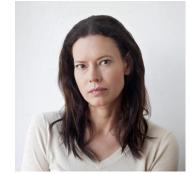
STFC Appointments

STFC Council – we have appointed 3 new members

- **JT Janssen** Chief Scientist at NPL and a member of the executive team. Distinguished for the application of quantum technologies and an NPL Fellow in Quantum Electrical Metrology.
- Jana Kolar Executive Director of CERIC-ERIC, a pan-European research infrastructure in the field of characterisation of materials and bio-materials. Formerly chair of the European Strategy Forum of Research Infrastructures (ESFRI)
- Lucy Edge COO and Executive Director, Satellite Applications
 Catapult. She is also Vice Chair of the Royal Mencap Society and
 Chair of Atheras Analytics

We continue to have 50:50 male: female balance on Council









Recent STFC Appointments / Recruitment

Director of RAL Particle Physics Department

- Prof Sinead Farrington has been appointed and will start 1 July 2024
- She is currently Head of the Institute of Particle and Nuclear Physics at the University of Edinburgh
 - a great appointment for STFC and RAL PPD



Director of UK ATC

- Current post-holder, Gillian Wright will be stepping down as Director this year she will maintain her role as MIRI PI (James Webb Space Telescope)
- Recruitment is underway with interviews later this month







STFC Strategic Delivery Plan

We have just entered the final year of the 3-year spending review allocation, FY22/23, FY23/24 and FY24/25

- STFC's Strategic Delivery plan set out our exciting plans for the three-year spending period
- Many new activities and investments across all STFC areas
- Also explains the role STFC will play in delivering UKRI's wider mission/vision
- Contains a lot of detail
 - defined our 3-year spending plan





STFC Strategic Delivery Plan

Part of our plan:

- Enhancing UK scientific links globally, **including seeking funding for** LHCb 2030 (CERN), Hyper-Kamiokande (Japan), US Simons Observatory (Chile), and Electron-Ion Collider (USA)
- Supporting the development of a pipeline of skilled apprentices, engineers and technicians by investing £2.5 million in the "STFC Skill Centre"
- Investment in a pipeline of novel technologies new early-TRL R&D scheme
- Investing £7.5 million in a new 'AI for Science' initiative within STFC's Scientific Computing Department
- New international partnerships: India, US and more.



Delivering our SDP: Pressures

The financial environment is not easy – inflation and more...

- In the planning for the 2021 Spending Review inflation was assumed to be 2%
 - Costs of construction and funding research (including university overheads) have increased much more rapidly...

Major projects: schedule slippage and cost increases

- We are currently funding 3 major astronomy construction projects in parallel and a range of smaller projects including:
 - ELT Instrumentation, SKA and LSST
- There are "challenges" with meeting the original schedules
- Many projects are seeing cost increase (inflation and/or schedule slippage)
- This is manageable, but is putting a lot of financial pressure on our budgets
 - Currently little headroom for new activities



We are largely on track to deliver our plan, despite challenges

Doctoral Studentships and Stipends

Update

- UKRI has announced several uplifts to the minimum PhD stipend level, which is currently £19,237 per year for 24/25, which is good news but comes at a cost
- STFC response
 - agreed position at STFC Council is to aim to maintain the balance between student numbers and the rest of the programme
 - for students starting in October 2024 we were committed to maintaining numbers at (or very close to) existing levels.
- STFC have issued DTPs grants covering October 2024 starts
 - 220 studentships awarded using our algorithmic approach.
 - Further work needed on how to future proof the algorithm given changes to astronomy grants process and moves to increase harmonisation and reduce



Fellowship Programmes

The main fellowship programmes for STFC are:

- Ernest Rutherford Fellowships (STFC):
 - A large number of applications received (again) this year (173 applications) with interviews taking place during the week of 15 April.
 - A big thank you to all members of our communities for helping with the peer review
 this is essential to operating this programme
- Stephen Hawking Fellowships (joint EPSRC/STFC): this scheme has now closed
- UKRI Future Leaders Fellowship
 - Round 8 applications received and sifted. Interviews will take place w/c 22 April
 - Round 9 opened 29 Feb and will close 18 June
- Discussions are starting on a more common fellowships offer across UKRI



UKRI & Collective Talent Funding

UKRI is continuing to transition to collective working on talent

- Update published recently
 https://www.ukri.org/news/update-on-collective-talent-funding/
- A common statement of expectations has been updated and published https://www.ukri.org/wp-content/uploads/2024/01/UKRI-300124-

 StatementExpectationsDoctoralTrainingJanuary2024.pdf
- UKRI is consolidating/harmonizing to two types of PhD award scheme
 - Doctoral Landscape awards broad flexible funding with awards shaped to meet needs of discipline
 - Doctoral Focal awards funding for research training in specific tightly focused themes or challenges
- I do not expect this to have significant impact on the STFC approach







UKRI Infrastructure fund (IF)

Scope of the Infrastructure Fund

- The UKRI Infrastructure Fund (IF) is aimed at supporting significant investments that enable a **step change in research and innovation infrastructure**
- Focus is on infrastructure providing national or international-level capability
- Funding is time bound to cover the costs of the significant change in capability
 - does not support longer-term maintenance needs, operational costs or uplifts beyond the life of the proposal
- The infrastructure must provide access, resources or related services to the wider, community outside the infrastructure host institution itself
- Two types of funding routes:
 - Full proposals: delivery of the infrastructure (typically £10m-£300m)
 - Preliminary activities: design/development/scoping work (typically £500k £5m)



UKRI Infrastructure Fund

Recent Updates:

- Wave 3 full activity outcomes announced a few weeks ago!
 - £48.8m for Electron-Ion Collider (US)
 - £124.4m for Relativistic Electron Diffraction and Imaging (RUEDI)
 - EPSRC sponsored project hosted at Daresbury Laboratory with Liverpool University providing the scientific lead
- Wave 4 Preliminaries were submitted in December 2023
 - STFC Council prioritized: XLZD (International Dark Matter Experiment) and AION
 - IAC met in March announcement expected this month
- Wave 4 full activities will need to be submitted to UKRI in Summer 2025
 - Deadline for Sol submissions targeting Wave 5 will be 1st May 2024
- Future planning full (major) proposal rounds every two years



STFC Infrastructure Fund projects

STFC has been relatively successful in securing funding

- Both STFC supported (PPAN Science) and STFC facilities projects supported by the UKRI Facilities Strategic Advisory Group
- Funded portfolio
 - 6 Preliminary Activities:
 - EIC, Boulby, ITRF, Next Generation GW, ELT Instrumentation
 - Diamond-II (CDR), UK-XFEL, ISIS-II
 - 8 Full Proposals:
 - Hyper-K, Simons Observatory, SKA, LHCb upgrade, EIC
 - Diamond-II, ISIS Endeavour, Vulcan 20-20, HiLUX and RUEDI (EPSRC)
 - Total investment of over £800m

This is a significant shift to STFC's approach to resourcing major PPAN projects



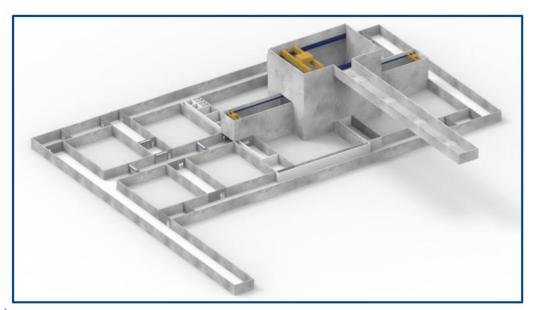


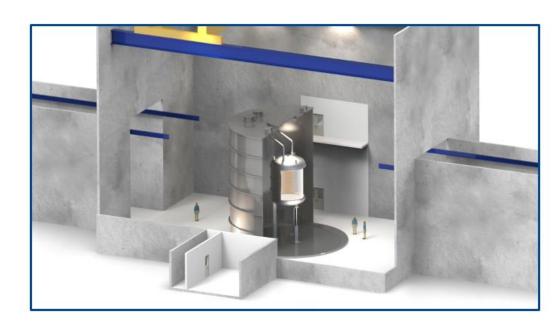
Major Strategic Initiatives & Opportunities

UK Hosting a Major International Project

As part of our SDP we committed to progressing the potential for the UK to host a major international fundamental science facility at Boulby

- This ambition to host an international science facility is also in the governments
 Science and Technology strategy
- Plans are progressing...



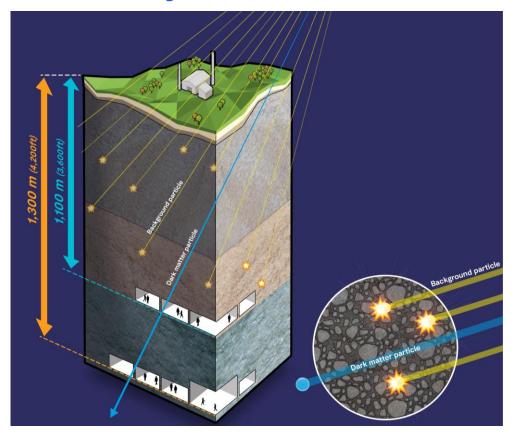




Boulby Status

We are discussing Boulby "Dark Matter Observatory" with DSIT

- Stage 0: £6m for excavation at 1.1km
 - Will commence "at risk" in 2024
- Stage 1: ~£50m for a new Boulby Lab at 1.1km
 - Will enable essential preconstruction work for e.g. XLZD
- Stage 2: ~£500m for new large experimentation lab at 1.3km plus UK's share of an international project e.g. XLZD



This is ambitious and we are at an early stage, but without ambition...



Space Gateway at Harwell

Flagship to scale up the UK's Space Capability

- Proposed new base for UKSA, staff from MOD's Space Command, the facilities of the Satellite Applications Catapult and part of STFC's RAL Space
- Proposal to fund through a **novel public-private partnership**, with the private sector funding the office and business incubation facilities and the public sector funding advanced scientific facilities
- We have a lot of interest and support from influential people
 - but funding source still unclear, but have by asked for funding options, e.g. public –
 private balance

Alongside Boulby, Space Gateway is likely to be one of our major Spending Review priorities with support from UKSA











Future of Compute Implementation

Multiple government investment in UK large-scale computing

Al Resources (AIRR) - £300m investment announced

- DAWN (Cambridge), deployed by end of the year
 - 1000 GPU system in collaboration with Intel/DELL
- Isambard-Al (Bristol)
 - 5000 GPU system based on top-end NVIDIA GPUs

AIRR+ - additional £500m investment announced

- Dec 2023 Initial engagement with potential hosts
- March 2024 Panel selection process

AIRR Programme is being managed by STFC







UK Strategy for Engagement with CERN

Purpose of the strategy

- Maximise the mutual benefits and impact of UK investment in CERN for both the UK and CERN
- Raise awareness of the opportunities afforded by CERN membership to multiple stakeholders
- Provide an action-oriented framework for delivery

Our vision is to unlock the full potential of our investment in CERN and remain central to its continued success, by working with our partners to lead scientific discovery and inspire the next generation



UK Strategy for Engagement with CERN

Unlocking the full potential of UK membership of CERN



House of Commons Astronomy Inquiry

We welcome the HoC S&T Committee inquiry: Key messages from STFC

- The UK is a key player in large-scale international projects, including SKAO and ESO's ELT. UK scientific influence and leadership on the global stage
- STFC's high-level plans for astronomy are set out in our Strategic Delivery Plan:
 - commitment to year-on-year increases in support for scientific exploitation of our major investments (CG uplift)
 - new funding for early-stage R&D and, in partnership with Innovate UK, uplifted funding for downstream commercialisation
 - New investments in capital projects: e.g. Simons, ...
- Strategy informed by deep advisory structure & linked to international strategies
- A key pillar of our strategy is to use the inspirational science in our astronomy and particle physics programmes to inspire the public.



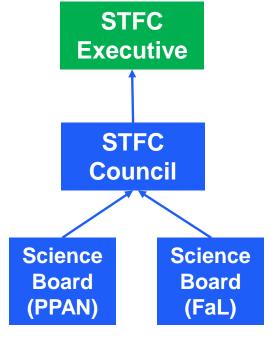




Improving our governance structures

General Structure

- STFC Executive Chair and STFC Executive Board
 - Decision-making with responsibility for STFC budgets
- STFC Council
 - Advisory to STFC Exec Chair and STFC Exec Board
 - Our top-level advisory body where all aspects of STFC come together, PPAN, Facilities and Laboratories, Innovation, ...
- In 2023 we changed our advisory structure to establish two parallel Science Boards with specific focus
 - Provide detailed scientific/technology advice to STFC Council
 - Make recommendations on strategy and priorities/roadmaps
 - Chairs: Keith Grainge (PPAN) and Jacqui Cole (Facilities & Labs)





Improving our governance structures

Changing role for Science Board (PPAN)

- New structure is bedding in
- Science Board (PPAN) will be tasked with fundamentally different questions
 - advise on long-term prioritized plans within "guide rails" of **realistic** financial budget assumptions
 - in this context, provide advice on balance of activities
- Greater transparency over current financial planning
 - boards will have sight of the possible trade-offs between activities
- Opportunity to change what business comes to the Science Boards
 - focus discussions on what really matters, so that STFC gets maximum value out of the Boards



PPAN Roadmap

During 2024, Science Board (PPAN) will develop a long-term prioritised roadmap to set the guiderails on future investments

- Balanced programme of excellent science across the PPAN research areas over a 10-year timeframe, within a realistic financial planning envelope
 - taking account of health and breadth of discipline
 - maintaining appropriate support to ensure return on past investments
 - exploiting UK leadership and capability in strategically important areas
 - engaging in future projects
- Rolling 10-year plan for STFC PPAN core programme
 - balance of exploitation, M&O, development projects, R&D etc.
 - balance of projects small/medium/large
 - studentships, fellowships, and skills pipeline
 - cross cutting themes e.g., quantum, R&D etc.



Role of our advisory panels

The Advisory Panels have been asked to provide input to SB (PPAN) to inform the PPAN Roadmap

- Advisory Panel should continue to update their roadmaps on regular basis as usual and no additional work is anticipated to update the current roadmaps to prepare for the PPAN Roadmap.
- The Advisory Panels will be asked key questions to inform the PPAN Roadmap, highlighting:
 - significant changes or discoveries that impact the current roadmap
 - new opportunities or risks that are not included in the current roadmap
 - recommendations that require significant update or revision
 - questions related to skills and new programmes e.g., quantum
- Input required by the September SB (PPAN) meeting (deadline likely early September)







Process for Statements of Interest (Sol)

Mechanism for identifying new opportunities and assessing them:

- Statement of Interest route refreshed to ensure:
 - Clear strategic case
 - Benefits of an investment understood
 - Future commitment estimated, e.g. future M&O
- Process
 - Biannual call for Sols to be submitted to Science Board (PPAN) 1 May & 1 Nov
 - Project teams should engage with programme managers throughout the year
 - Demand managed through alignment with the PPAN Roadmap
 - Further information available on the Sol webpage:
 - https://www.ukri.org/who-we-are/stfc/how-we-are-governed/advisory-boards/science-board-statement-of-interest-for-new-projects/



Process for Statements of Interest (Sol)

Infrastructure – Wave 5 Preliminary Activities (PAs):

- Deadline for Sol submissions is 1st May and should use the standard Sol template provided on the Sol webpage
- De-risking PAs
 - De-risk a future infrastructure fund investment such as the delivery mechanism or technical design, better understand the costs, or to run a pilot
 - Up to £8m total over 4 years, but most PAs are expected to be £5m or less
- Environmental sustainability PAs
 - Understand, plan, and mitigate environmental sustainability aspects of an IF project
 - Up to £2m over 4 years
- PA submissions must be a high strategic priority, with strong evidence for the timeliness of submissions





Very brief PPAN Programme Update

Astronomy Grants Panel (AGP) Update

The Astronomy Consolidated Grants scheme has now been replaced with two new schemes:

Small Awards

Typically, a single 3-year PDRA project, PI/Co-I (20% FTE max total) and tech/support/travel/consumables, focussed on a distinct project, 3 years maximum.

Large Awards

Typically, several PIs and several PDRAs. Co-ordinated to address a thematic area. Includes expression of interest stage. 9-25 person-years of PDRA effort. 3-5 year duration. Tech/support/travel/consumables/equipment. Limits are on effort/resources, not a cash limit.



Small Awards Update

The first Small Awards round has concluded, and announcements have been made:

- 174 proposals were sent for review and 84 projects were recommended for support (48.3% success rate)
- 30% of eligible applicants did not apply
- Average of 12.6% FTE per funded applicant
- Marked increase in number of consortium applications, which were very successful
- AO/AT to SS/PL ratio was 0.71:0.29 (requests and supported)

2024 Round:

- Small Award proposals have been submitted via the new UKRI Funding System, deadline 12 March 2024. Proposals out for review.
- Panel Meetings take place September 2024.
- Science Board and UK Space Agency endorsement October 2024.
- Aim to inform Applicants of the outcome end of November 2024.



Large Awards Update

2024 Large Awards Round

- 39 EOIs were submitted by the 31st October deadline.
- Sifting panel met virtually on 5th December.
- Sifting panel recommended that 11 EOIs be considered by the AGP in the full proposal stage.
- Project Leads of successful EOIs were invited to develop a full case for March 2024 deadline.

2025 Large Awards Round

- Scheme will open on The Funding Service in July 2024
- Expressions of interest deadline in October 2024



SKAO

Headlines

- The SKAO has completed 31 months of construction activity of a projected seven-year construction phase:
 - Over 77 construction contracts have been awarded for a total commitment of ~ €678M
 - First SKA-Low telescope antennas deployed in Australia
 - To date UK awarded contracts for up to £45M
- UK SKA Regional Centre (SRC) Project underway:
 - UK Regional Centre Prototype by 2025
 - Aim to use pre-cursor data to stress test technical & science pipeline
- Membership India and Canada latest new members





LOFAR

- LOFAR became an ERIC (European Research Infrastructure Consortium) in January 2024.
- Founding Members are Bulgaria, Germany, Ireland, Italy, the Netherlands, and Poland.
- UK currently collaborating with LOFAR ERIC and intending to join as a full member in 2024
- LOFAR ERIC will implement a substantial upgrade across the distributed infrastructure, and serve the astronomy community with a cutting-edge suite of observing and data processing capabilities.
- LOFAR ERIC will provide transparent access to a wide range of science research services for the European and global community.





ESO

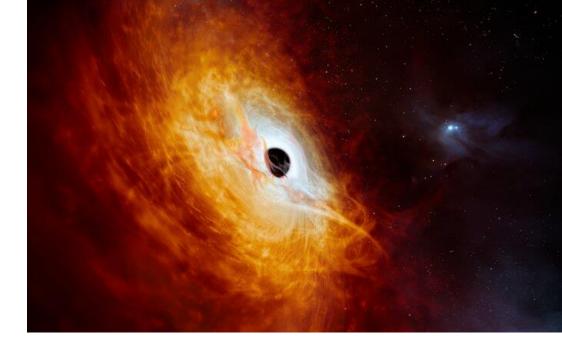
Highlights

- Construction of the ELT is making excellent progress (see next slide)
- ELT Instrument programme is making progress, including UK involvement in HARMONI, MOSAIC, ANDES and METIS.
- New Chair of ESO Council: Tom Ray.

Holding individual meetings with all Council delegates.

- Current Director General retires in 2026. Selection process for new DG is under consideration.
- Process to identify the next (post-ELT) programme is under consideration.





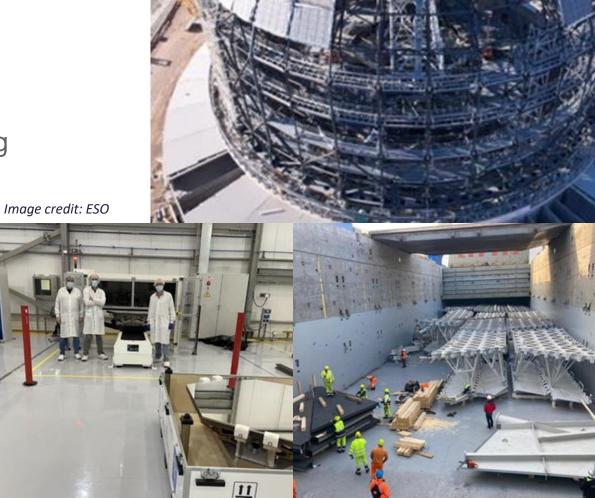
Science Highlight:

- Most Luminous and Fastest-Growing Quasar identified using VLT. Mass 17 billion times that of the Sun and is growing in mass by the equivalent of another Sun per day
- Artists Impression credit: ESO/M.Kornmesser

Extremely Large Telescope

Excellent progress being made in Chile (images clockwise from top right)

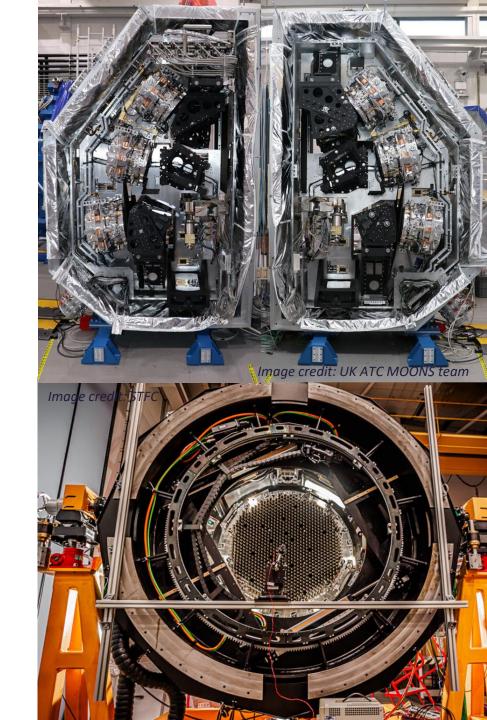
- DMS (Dome and Main Structure) is ~75% complete and the installation of cladding is progressing well
- The M1 cell structure has shipped
- M1 segment coating has started on Paranal
- M2 polishing nears completion
- Lateral tracks and M1 cell support beams are being installed



MOONS Enters Acceptance Process

- MOONS spectrograph and front-end are now fully integrated and successfully tested in combined operation at UK ATC.
- Verified performance requirements above the specification.
- ESO Preliminary Acceptance Europe has started with vibration testing. Two-month process, ahead of shipment to Paranal in the summer.





Simons Observatory

- SO currently consists of one Large Aperture Telescope (LAT) and three Small Aperture Telescopes (SATs).
 Telescope deployment to site is well advanced
- SO:UK will add two further SATs, a UK-based data centre and development of the data pipeline.
 Instrumentation program is well-advanced.
- The first SO:UK SAT alt-az mount is undergoing final integration at CPI-Vertex in Germany (top right)
- Test cryostat at University of Manchester for testing the continuously rotating cryogenic half-wave plates to be used on the SO:UK SATs (bottom right)



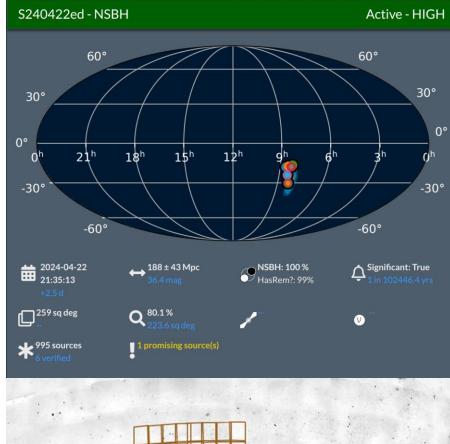


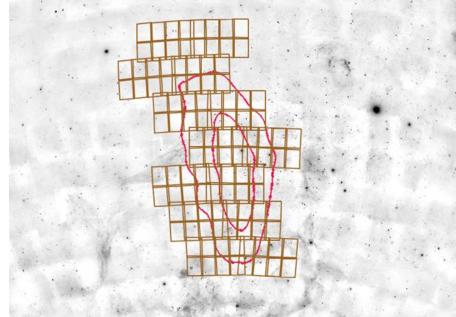
GOTO

Identifying optical counterparts to GW events.
GOTO (Gravitational-wave Optical Transient Observer)
is an array of 32 wide-field telescopes in two clusters
has started operations

- GOTO can cover the whole sky from its two sites in La Palma and Australia
- Fully automated operations using robotic control systems and autonomous schedulers
- ***Hot off the press***
- S240422ed gravitational wave event
- Black Hole Neutron Star merger event
- GOTO observed 96% of the skymap area, with both sites contributing. Observations starting within 3 minutes from the GW alert







Working with UK Space Agency AGENCY



STFC works closely with UKSA in accordance with the Dual Key agreement.

- Covers how STFC and UKSA agree strategic priorities for astrophysics in space.
- STFC responsible for:
 - Blue skies technology development for ground or space-based science instruments (TRL 1-4).
 - Funding basic research related to space science and space exploration and to exploit results, data or findings from space science missions for scientific purposes.
- UKSA responsible for:
 - Development of instrument technology for specific missions (TRL 4+)
 - Design, development and operation of scientific payloads, missions and associated ground-based data processing facilities.



Working with UK Space Agency K SPACE AGENCY



In practice:

- UKSA will ask Science Board PPAN for strategic advice on UK investment missions and STFC will ask UKSA to endorse Exploitation grant outcomes.
- Cross representation between Science Board PPAN and UKSA SPAC
- UKSA is invited to AGP peer review meetings and comments on remit and overlaps.
- STFC Advisory Panel Chairs, UKSA and STFC Programmes meet regularly.
- STFC, UKSA, EPSRC, NERC are all members of the SPace Academic Network (SPAN) to discuss wider space science and space economy issues.
- Recently UKSA and STFC joint funded a technology development scheme.
- Consideration being given to how UKSA can feed into upcoming PPAN Roadmap development.
- Joint discussions on Spending Review priorities.
- Planning to hold joint community meeting in 2024 to consider ways to enhance Dual Key relationship.



Computing

- **DiRAC** High Performance Computing distributed computing, national, supporting the STFC theory community. Operations funding April 2023 March 2026.
- **DiRAC Resource Allocation Committee** peer review of RAC16 proposals complete, computing allocations to start April 2024. RAC17 will open in due course.
- IRIS delivering distributed computing, supporting STFC science.
- STFC Exascale requirements the STFC Exascale Working Group has been working with the community to gather STFC's requirements for an Exascale ecosystem. Any comments welcome: STFC Exascale WG@leicester.ac.uk
- **UKRI opportunity** <u>Access to High Performance Computing facilities 2024</u> open and flexible route to computational support. Closing date 23 April 2024.



Quantum

Update on Quantum Technologies for Fundamental Physics (QTFP)

- Applies the latest advances in quantum science and technology to explore and answer long-standing research questions about the universe and its evolution.
 - £32m for 7 large consortia over 5 years
 - £6.3m for 17 small projects over 2 years
- Key question is exactly what comes next still uncertain due to the linkage with EPSRC and the National Quantum Technology Programme

More widely across STFC

- Strengthening links with the US DOE
 - Held a high-level workshop at RAL to discuss UK-US laboratory-laboratory collaboration on quantum and AI/Computing
- An STFC Quantum Strategy is under development



STFC Astronomy Team

Key Contacts:

- Associate Director: Jenny Hiscock (jenny.hiscock@stfc.ukri.org)
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Questions?