

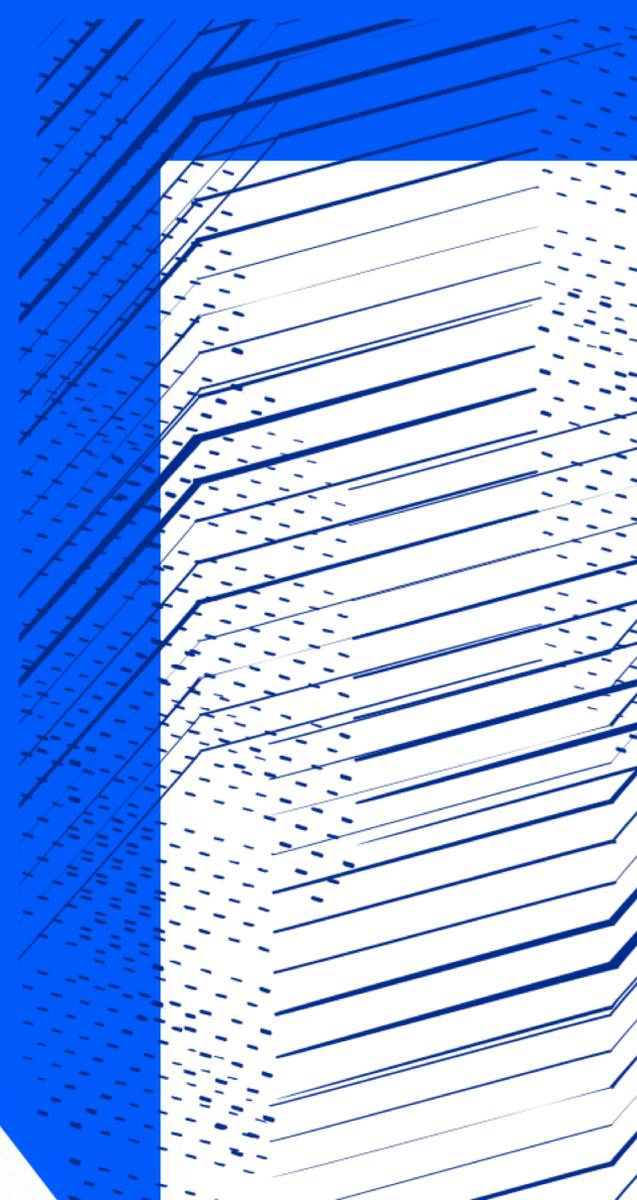


Science and  
Technology  
Facilities Council

# STFC Update

Mark Thomson  
STFC Executive Chair

6 February 2020



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# STFC's mission

Discovering the secrets of the Universe  
Developing advanced technologies  
Solving real world challenges

## Responsibilities:

- Frontier research: particle physics, astronomy, nuclear physics and space science
- Major UK multi-disciplinary facilities
- Stewardship of our campuses

Underpinned by advanced technologies



# Our goals

**World-class Research** Sustaining the UK's position as one of the world's leading research nations

**World-class multidisciplinary facilities** World-leading large-scale multidisciplinary infrastructure enabling research across UK Research and Innovation

**World-class Innovation** Using the innovative capacity of STFC's science and research facilities to support the growth of a high-tech UK economy

**World-class Skills** Delivering the scientific and technically skilled workforce that the UK needs to compete in a globalised knowledge economy

**Operational Excellence** Underpins the way we work

# Our sites

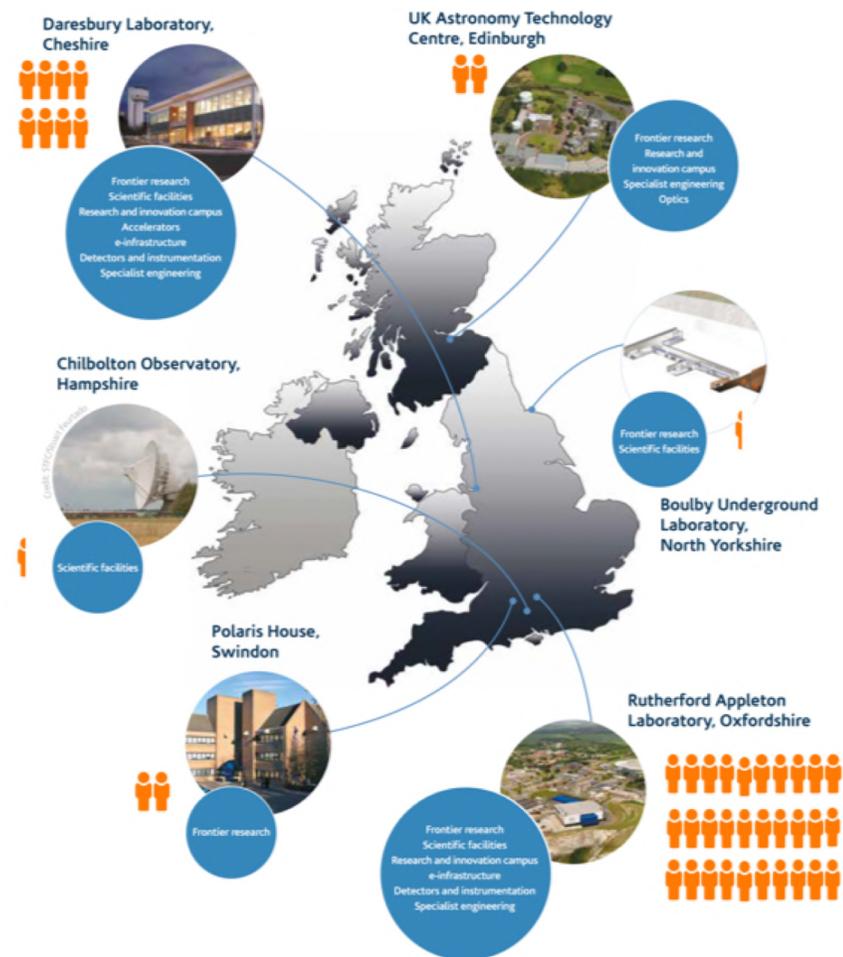
Six sites across the UK + ING in La Palma

Around 2,400 staff

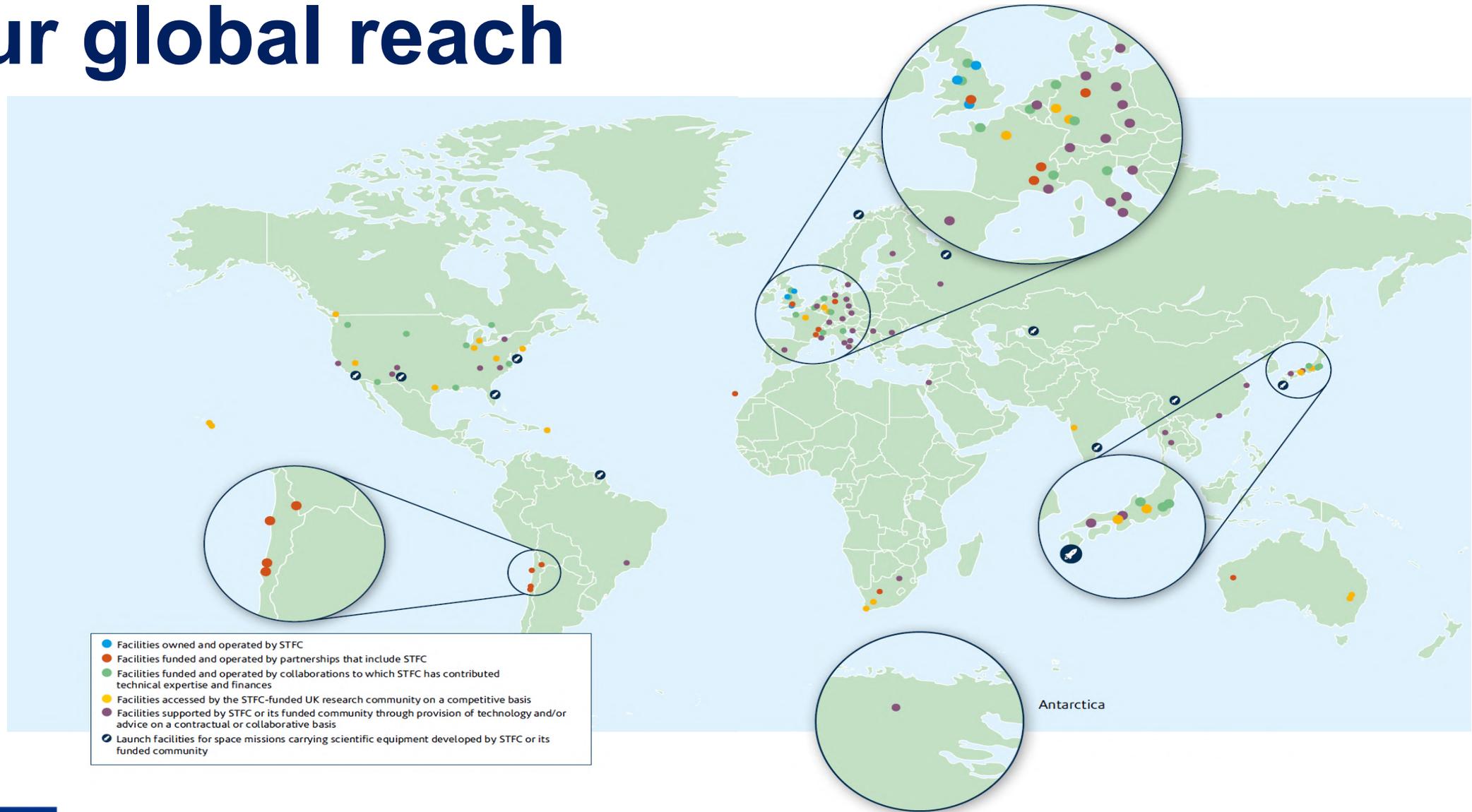
- 80% are in STEM roles

STFC as part of UKRI

- STFC provides the necessary high-tech scientific and engineering support for >5,000 industrial and academic researchers from **across all domains**



# Our global reach



# Our global reach

Most of what we do involves deep international connections

- the collaborations are incredibly important and exciting
- but management is complex

- 
- Facilities owned and operated by STFC
  - Facilities funded and operated by partnerships that include STFC
  - Facilities funded and operated by collaborations to which STFC has contributed technical expertise and finances
  - Facilities accessed by the STFC-funded UK research community on a competitive basis
  - Facilities supported by STFC or its funded community through provision of technology and/or advice on a contractual or collaborative basis
  - Launch facilities for space missions carrying scientific equipment developed by STFC or its funded community

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# DKIST

## The largest ground based solar telescope in the world just had 'first light' in Hawaii

- Led in US by the NSF with the UK (STFC) and Germany as the two international partners
- Will deliver unprecedented resolution imaging to understand our nearest star
- STFC has supported all nine cameras, led by Queens Belfast, in return for UK access for six years
- Excellent R&D links with UK industry
- Andor Belfast has released camera design as a commercial product

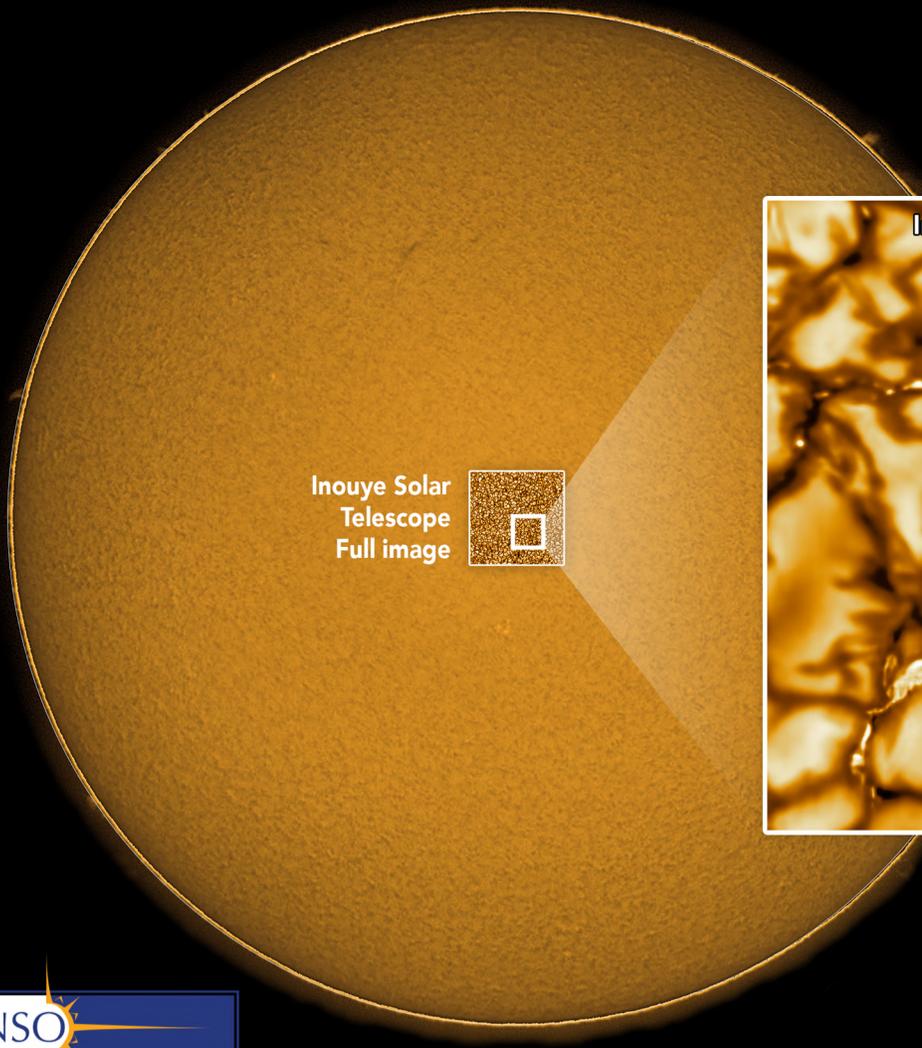




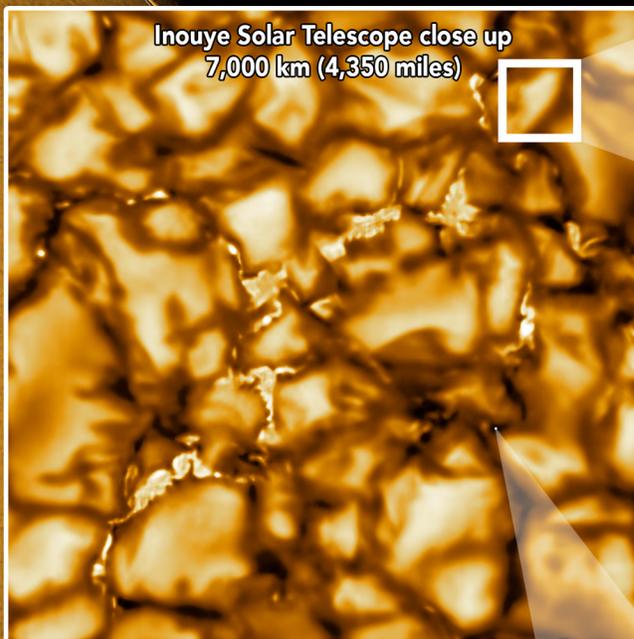
National  
Science  
Foundation

# Daniel K. Inouye Solar Telescope

The Inouye Solar Telescope sees large bubbling cells the size of Texas but can also see tiny features as small as Manhattan Island. This is the first time these tiny features have ever been resolved. The Inouye Solar Telescope is showing us three times more detail than anything we've ever seen before. For more information about this telescope, visit [www.nso.edu](http://www.nso.edu)



Inouye Solar  
Telescope  
Full image



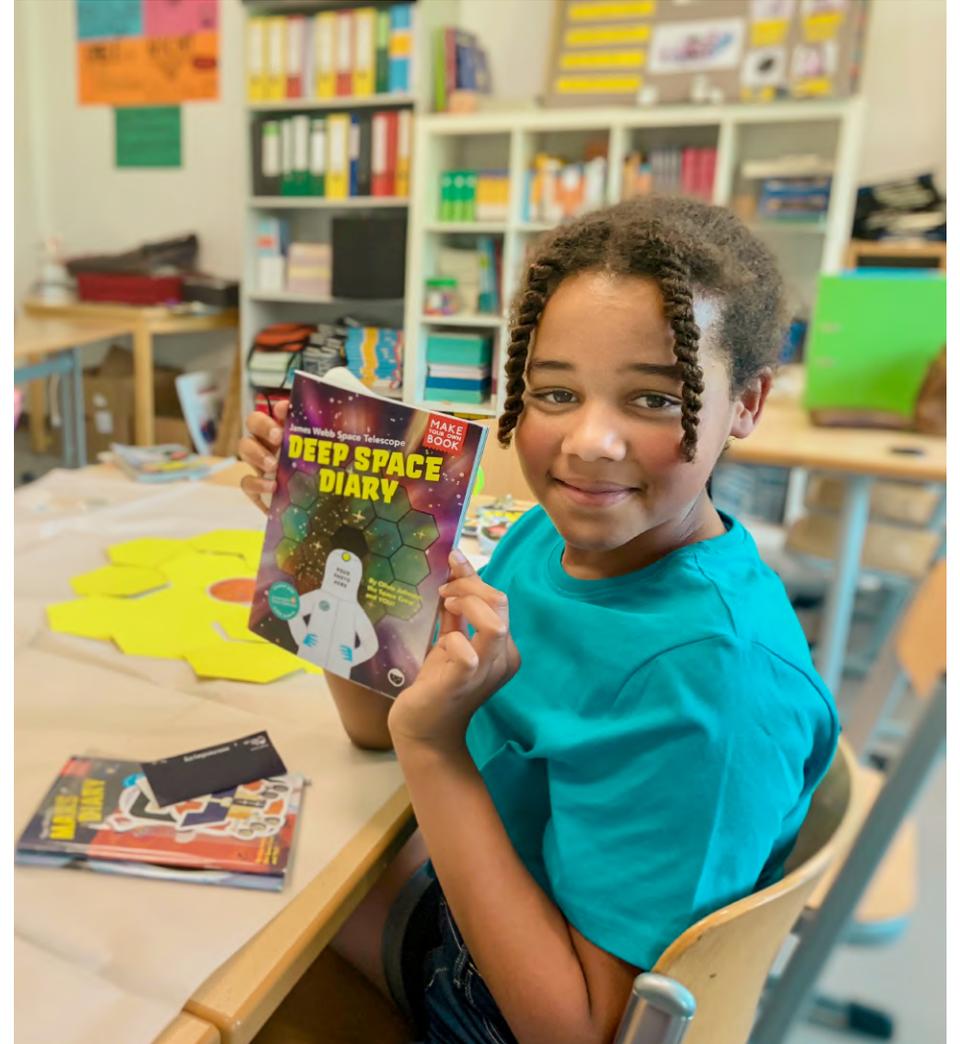
Inouye Solar Telescope close up  
7,000 km (4,350 miles)



# STFC outreach

Public Engagement is a central part of STFC's mission, astronomy has a big role. For example:

- A national public engagement campaign for the James Webb Space Telescope delivered with JWST experts, education partners, science centres, planetaria and astronomical societies
- To date over 50,000 school children have had access to curriculum-linked, participative learning resources developed through the campaign
- See [jwst.org.uk](http://jwst.org.uk) for more information



# STFC outreach

**Public Engagement is a central part of STFC's mission, astronomy has a big role. For example:**

- The *Wonder* initiative is building new local partnerships to engage with groups from the 40% most deprived areas of the UK
- Lightpool at Blackpool Illuminations, Professor Robert Walsh UCLAN
- The Association of Science and Discovery Centres are creating partnerships with community groups



# UK invests £65m in international science

## Two weeks ago:

- UKRI and the US Department of Energy signed an agreement outlining £65 million worth of contributions that STFC and UK scientists will make to the international Deep Underground Neutrino Experiment (DUNE) hosted by DOE's Fermi National Accelerator Laboratory
- DUNE will study the properties of neutrinos, which could help explain more about how the universe works and why matter exists at all
- UK scientists have held leadership positions in DUNE since the inception of the collaboration in 2015. The agreement gives the green light to build major components in the UK for this “mega-science” project.



# PIP-II

## PIP-II accelerator project (for DUNE) passed its DOE CD-2 review

- The major review of the \$888 million PIP II upgrade concluded 30<sup>th</sup> January
- STFC Daresbury Laboratory will deliver three Superconducting (SC) cryomodules and support UK Industry in developing SC cavity manufacturing capabilities
- More than 30 DoE reviewers scrutinised the technical and project plans
- There was strong representation from the UK at the review, which was well received



# National Satellite Test Facility

## Progress is good

- Agreement on the cost of the construction of the National Satellite Test Facility, within the allocated funding envelope
- On site progress continues to run very well and some major earthworks and civil engineering tasks completed in November:
  - Removal of 2,800 m<sup>3</sup> of earth to create the hole for the basement where the vibration equipment will be housed
  - Foundations for the plant room and the electromagnetic compatibility chamber are nearing completion



Basement: 25 October



04 December

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# Funding: Context

## Ten years of flat cash

- Resources eroded by inflation over an extended period: ~25 % in real terms
- This has impacted all of STFC's activities
- As far as possible, we have tried to protect the breadth of the science programme
- However, flat cash is clearly having a significant impact

## Formation of UKRI in 2018

- Brought together the seven research councils within a single organisation
- Significant additional “central” resources in a number of hypothecated “Cross-cutting” funds
  - Not the solution to the pressure on the core programme
  - But, still very positive news

# UKRI Cross-Cutting Funds

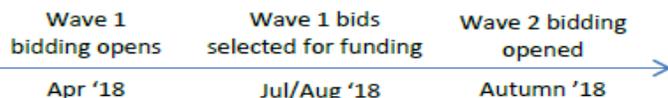
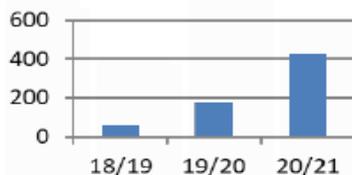
## UKRI funding streams

### Strategic Priorities Fund

UKRI partner-led proposals that are:

- Multi/Inter-Disciplinary cutting edge research or;
- National strategic research or innovation priorities or;
- Strategic cross-cutting R&D aligned with Government priorities

Total: £560m

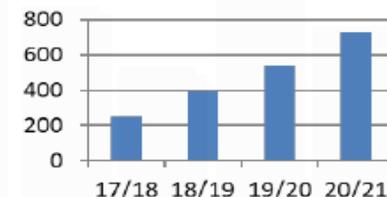


### Industrial Strategy Challenge Fund

£1,024m was awarded for Wave 1 challenges from '17/18. Supports industrially-led proposals where:

- UK has world-leading research base and businesses ready to innovate
- There is a large or fast-growing global market

Total: £1,907m

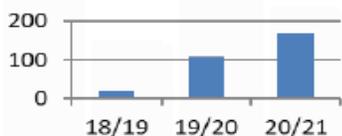


### Talent

Budget '17 announced £300m, building on initial spend in '17/18:

- PhD Studentships
- Innovation Scholarships
- Future Leaders Fellowships
- Rutherford International Leaders (Schemes run beyond 2020/21)

Total: £300m



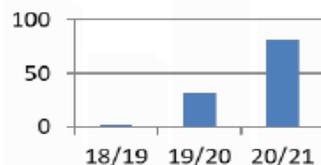
### Overall timeline

### Strength in Places Fund

Research and Innovation-led proposals for regional economic growth:

- Areas with genuine potential and emerging capacity
- Collaboration with local partners
- Encourage bids from Science and Innovation Audit areas

Total: £115m

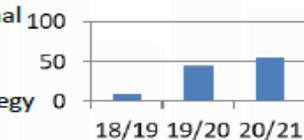


### Fund for International Collaboration

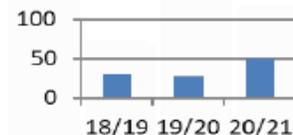
Criteria:

- Quality of research/innovation
  - Commitment from international partner(s)
  - Additionality
  - Aligns with International Strategy
- Wave 1 (Summer '18) → Wave 2 (Autumn '18)

Total: £110m



Total: £108m



### Commercialisation

- HEIF
- ICURe
- Review of commercialisation activity ongoing

May 2018

Summer 2018

March 2019

Spring 2019?

Late 2019?

UKRI High Level Strategy published

Work on 19/20 allocations

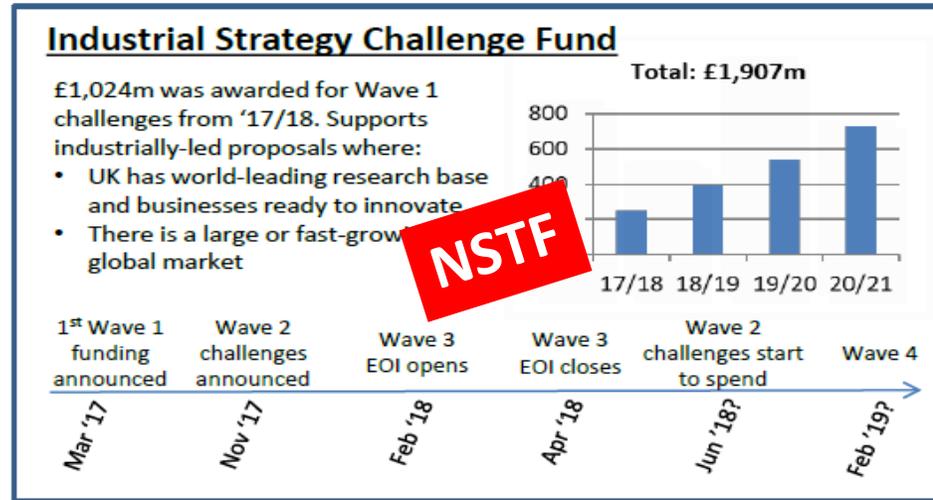
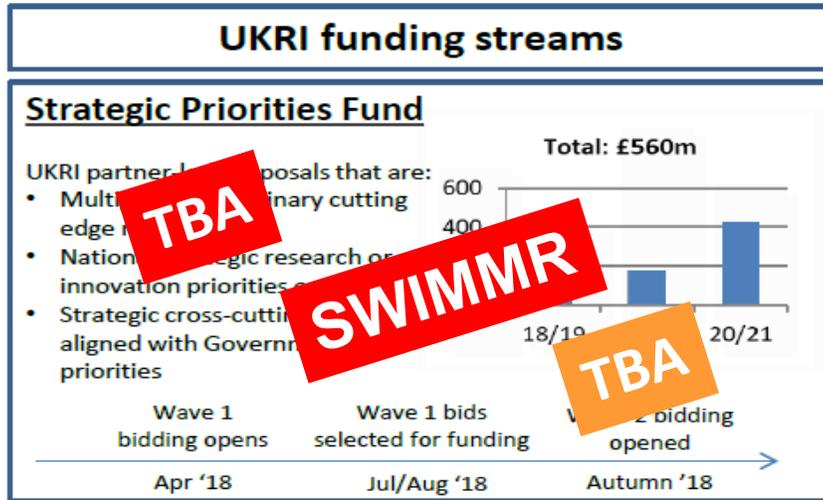
Council Strategic Delivery Plans agreed

Initial preparations for 2019 Spending Review?

Spending Review Outcome?



# UKRI Cross-Cutting Funds



# UKRI Future Leaders Fellowships

## UKRI FLFs supporting early career researchers and innovators with outstanding potential across the whole of the UKRI:

- Develop, retain, attract and sustain talent in the UK
- Foster new research and innovation career paths including those at the academic/business and interdisciplinary boundaries and facilitate movement of people between sectors
- Provide sustained funding and resources for the best early career researchers and innovators
- Provide long-term, flexible funding to tackle difficult and novel challenges and support adventurous, ambitious programmes.

# UKRI Future Leaders Fellowships

UKRI FLFs supporting early career researchers and innovators with outstanding potential across the whole of the UKRI:

- Develop, retain, attract and sustain talent in the UK

- Foster **STFC Science community has done well**

- 6 FLFs in wave 1

- 7 FLFs in wave 2

- Provide **• wave 3 to be announced**

- and in **A real uplift in opportunities for young researchers**

- Provide long-term, flexible funding to tackle difficult and novel challenges and support adventurous, ambitious programmes.

# Stephen Hawking Fellowships (STFC/EP SRC)

**Support and develop the next generation in theoretical physics and areas of mathematics/computer sciences which underpin the development of theoretical physics:**

- Up to five annual calls (2019-2024) with up to 10 fellows per call
- Up to 4 years' funding for fellows
- Round 1 outcomes to be announced
- keep watching for Round 2

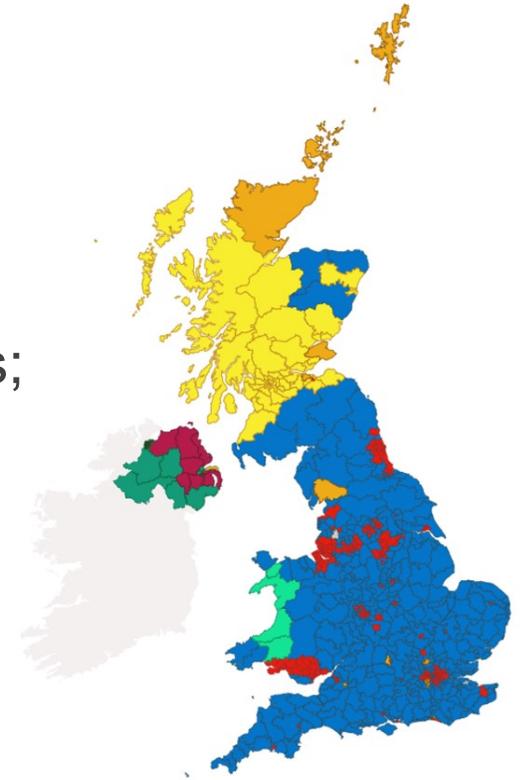
**Scheme objectives are:**

- To fund new high quality research and support the development and training of postdoctoral researchers in the field of theoretical physics
- To train a cohort of researchers with the skills to continue a legacy of public engagement in the field of theoretical physics

# Funding: looking forward

## New Government:

- Large overall Conservative majority, SNP gains in Scotland
- To date, the PM has made a small number of Ministerial changes; may be a wider reshuffle post-Brexit (February)
- The government's agenda for the next year was presented in the Queen's Speech at the State Opening of Parliament, included:
  - Legislation to take the UK out of the EU on 31 January
  - UK to operate a points-based immigration system
  - Government will prioritise investment in infrastructure, science research and skills – **strong and consistent message**
- Spring Budget on March 11<sup>th</sup>
- A full spending review in the summer/autumn ?



# Spending Review: Likely STFC Priorities

**STFC is working with UKRI on the priorities within a flat real and an increased budget scenario towards 2.4% GDP spent on R&D. We previously identified five priority areas:**

- Sustaining UK Research and Innovation Leadership
- Investing in the Talent of the Future
- Attracting Inward Investment with state of the art laboratories and infrastructure
- Inspiring Innovation
- Technology and Innovation for UKRI

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# Programme Evaluation

## The Astronomy Programme Evaluation is complete and endorsed by Science Board (SB)

- Next step is to undertake an assessment of the Balance of Programme across the Science Board programme, to ensure that resources are planned in line with the priorities from the Evaluations.
- For Astronomy, as before, the highest priority remains exploitation (including space), along with investment in ESO / ELT and the SKA
- However, the community highlights maintaining a responsive and broadly-based programme as a key factor in the continued success of the UK programme, despite very constrained budgets.

# Status of Programme

## Astronomy Grants Panel (AGP)

- STFC was finally given approval to commit to the 2019 grants round just before Christmas, after a short delay beyond our control. Most awards are now made.
- The 2020 round is expected to include several new proposals, possibly reflecting the lead up to the REF.
- New chair (from Jan 2020) is Prof Mark Sullivan (Soton), Dan Brown (UCLAN) will be deputy
- The Head of Astronomy Awards (Kim Burchell) awarded the 2020 RAS Prize for Service

## Consolidated Grants Review

- A panel is being created to look at the recommendations of the Review of Consolidated Grants and recommend how they might be implemented.
- A key element would be to offer an alternative but complimentary scheme similar to the old standard grants, but with tight demand management. Larger awards would continue.

# ESO & SKA

## ESO

- Good progress with ELT and with the UK-led ELT Instruments
- However, concerns that the current budget may not cover all risks – options being considered, including new members

## SKA

- Good progress with preparation for contracting and construction
- Concerns on budget and possible small delay in HMG ratification of the IGO
- Targeting construction start in 2021



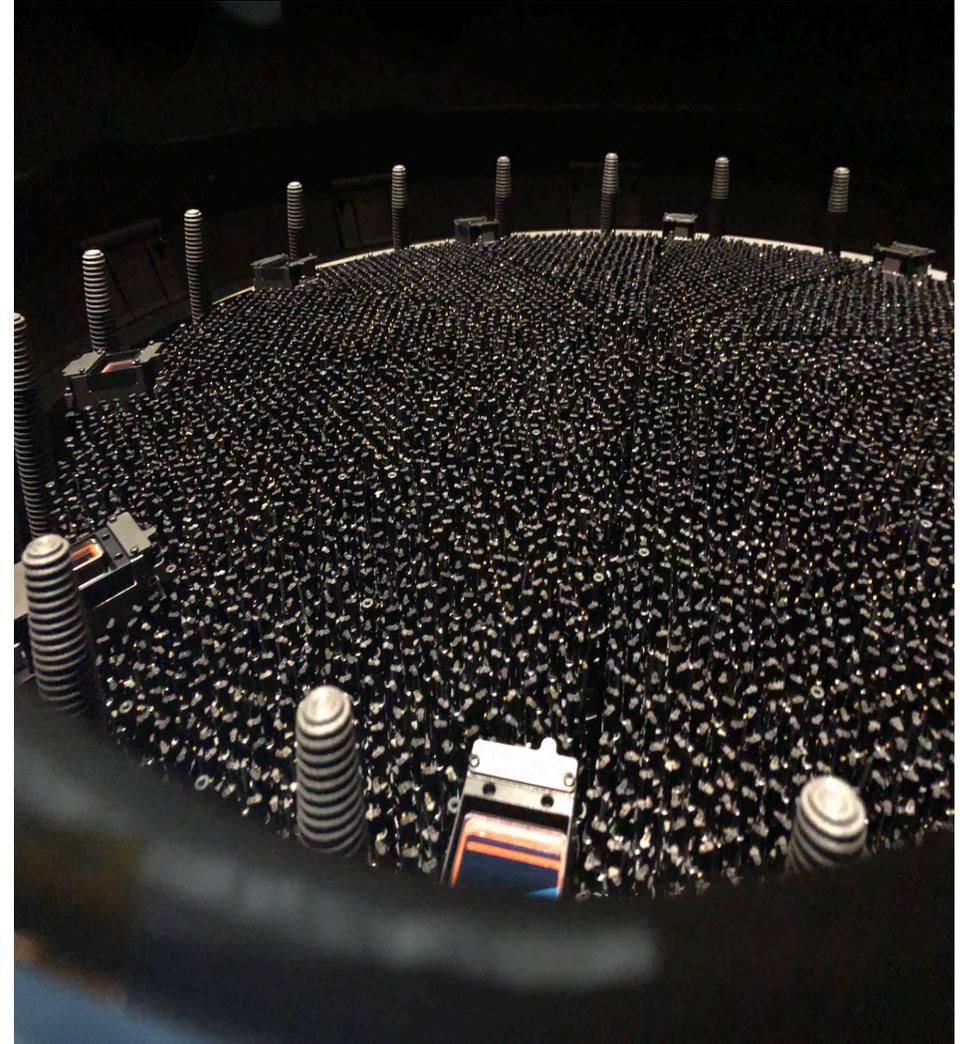
# Progress on projects (1)

## LSST

- Making good progress with agreeing a deal with LSST in the US for our proposed in-kind contributions to operations (around software effort and data handling)
- The expectation remains that this will deliver access for the whole UK community when the telescope enters operation mode in 2022

## DESI / DKIST

- DKIST has first light
- DESI is being commissioned
- Both entering the exploitation phase



# Progress on projects (2)

## CMB

- Following Science Board endorsement, modest seed-corn funds have been awarded to the UK consortium in the US-led Simons Observatory

## GOTO & WFU

- Funds have also been allocated to GOTO and the Wide Field Units in line with Science Board recommendations

## WEAVE & ING

- Good progress is being made toward the start of commissioning of WEAVE but the date has been put back by a few months, largely due to delays from non-UK work packages
- HARPS3, led by Didier Queloz, is reported to be on schedule.
- Sir John Kingman, Chair of the UKRI Board, is planning on visiting ING in 2020

# Progress on projects (3)

**We have a large number of projects seeking funding via Science Board and the Astronomy Programme in 2020. These include:**

- UK interest in CUBES and BlueMUSE for ESO,
- MARVELS in La Palma,
- JCMT operations,
- R&D towards the EST
- Plus a number of pre-launch space mission science programmes, including JWST, Euclid, Solar Orbiter, Ariel and Plato)

**With a flat budget, our ability to support all of these is extremely limited, but demand demonstrates the vitality and ambition of the UK community**

# Other Developments

## Advisory panels:

- The SSAP and AAP have advised on the updated list of ‘priority projects’ – which will be held pending opportunities for seeking funding
- The APs are planning on updating their respective roadmaps in time to present to Science Board during their annual update in June. Steve Serjeant will comment on the AAP programme in the next talk.

## Technology R&D

- We are just starting to review the projects R&D scheme (PRD), the “New Opportunities” and Capital calls, with a view to ensuring these tools are the best use of limited, uncommitted, modest sums to develop technology and novel ideas

# ...and finally

## Other activities

- We are pursuing a series of high level meetings with **UKSA** – focussed on key issues and opportunities
  - This covers all our interests including the NSTF, the Space Catapult Centre, bi-laterals and a national space programme
- We are pursuing bids for **DiRAC and e-infrastructure** in general
- We are leading on the development of the next European Science Vision and Roadmap for Astronomy via **Astronet** with a plenary panel meeting planned for April in Bologna and a session at the EWASS in Leiden.

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# Summary and outlook

## Summary

- There will always be challenges – flat cash is clearly a significant issue
- Despite that, the UK astronomy programme remains vibrant

## Outlook

- There will always be challenges – but there are many reasons to be optimistic
- Next three to nine months are critical to the future of UK research and innovation
  - signals from government continue to be clear and positive
  - STFC is working with UKRI to develop a positive and ambitious strategy
  - Watch this space



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# Thank you



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