



JAM Tomorrow

UKEXOM

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- How does Exoplanet research fit?
- What are the pressures & opportunities?



What is the Astronomy Programme?



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Astronomy Programme

Broadly Astronomy funding covers:

- Exploitation grants (~£29m p.a.);
- ESO membership and E-ELT development (~£25m p.a.);
- SKA preparation (~£9m p.a.);
- Other operations and developments - ING, e-MERLIN, LSST etc. (~£12m p.a.);
- Currently, broadly flat-funding, including recent investments.

Particle astrophysics (LIGO, CTA), Training and Fellowships (£25m) and Public Engagement (£1.3m) and HPC are funded separately.

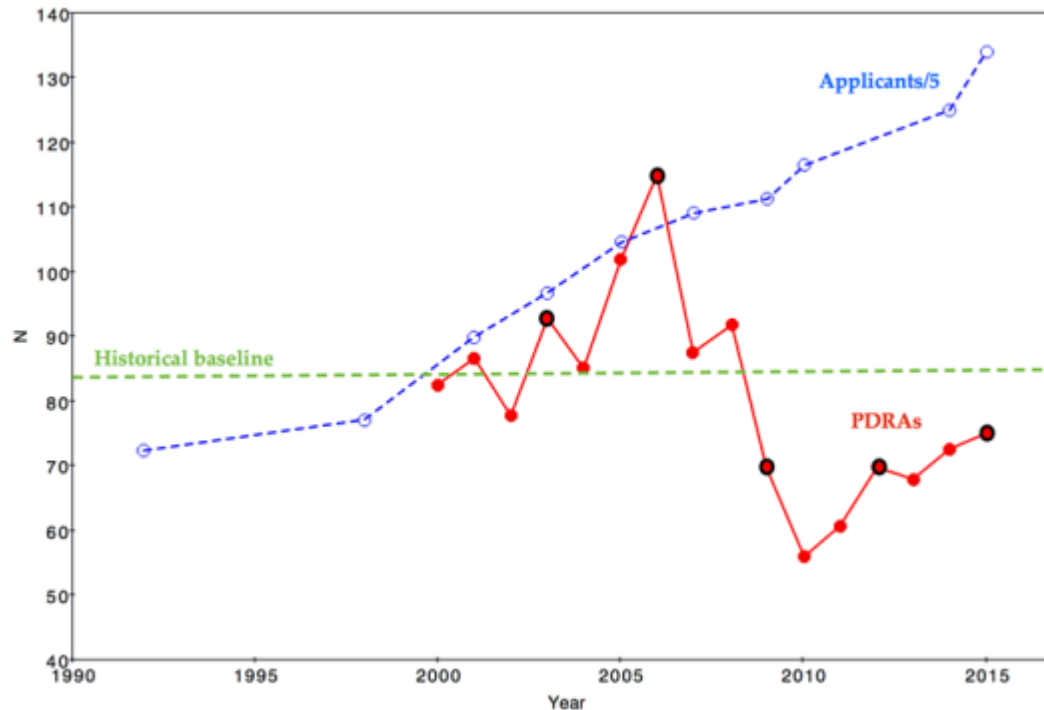


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2015 Grants round

- In the 2015 round AGP received a total of 32 applications with 253 co-applicants proposing a total of 213 projects
- These requested 217 PDRAs and technicians at a total cost of £27M p.a.
- We were able to support 89 of the highest-ranked projects, comprising funding for 80 PDRAs and technicians and various levels of FEC support for 163 co-applicants, costing £10M p.a.
- Flat-cash funding starting to bite
- Community continues to grow – mixed blessing





The evolution of PDRA support provided by STFC/PPARC astronomy grants compared to the growth of the UK's academic research community



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DiRAC

- DiRAC is designed to cover all aspects of HPC for STFC funded science
- Hardware and operational costs are provided by STFC, outside of the Astronomy grants process
- Continue to provide modest additional support for University systems, preparation and networking
- DiRAC Project assessment is via a dedicated panel and the programme management by a committee chaired by Jeremy Yates (UCL)



DiRAC III



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Computing Strategic Review

December 2015



- We recognise that DiRAC requires planned updating and development
- Funding dependent on the CSR
- Needs to be part of a broader and more integrated approach to STFC computing
- Likely to be strong links to Big Data and
- Likely to be considerable efforts to federate other large computing provisions: SKA/LSST/Euclid/UKT0/GridPP etc.



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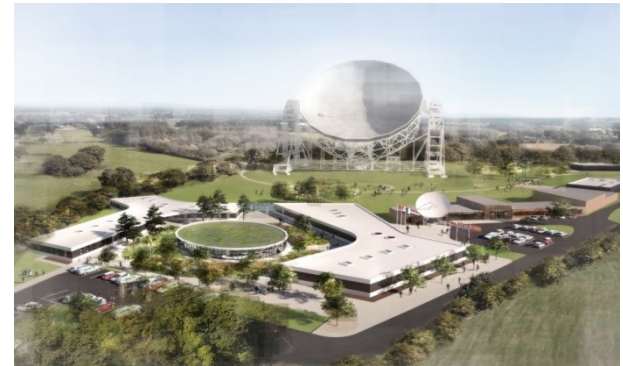
ESO

- Construction of the E-ELT is underway in Chile, in two phases. Major construction contracts have been let, following ESO approval
 - Poland just joined – Norway and Ireland in discussion
 - Brazil still awaits Presidential approval, but is not needed for now
- STFC approved next phase of E-ELT instrumentation awards – with major funding for HARMONI, modest support for METIS, MAORY and further Research & Development towards a role in HiRES and a MOS / MICADO
- ALMA nearing full operation. Improvements made in observing efficiency and data return and strong UK science involvement leading to exciting science.



Square Kilometre Array (SKA)

- UK Government pledged over £220M for first Phase – Business Case approved by HMT
- Won modest funding from H2020
- International negotiations on Treaty underway – hope completed by summer
- HQ at Jodrell Bank – construction just starting
- Huge potential for industry – liaison officer being appointed
- Start construction of first Phase in 2018
- Operation in early-2020's



Space Programme



- STFC provides funds for exploitation and blue skies technology via AGP – on average 10% of total new funding goes to technology (ground and space).
- Recent LISA Pathfinder and Mars Explorer launches, then Bepi Colombo, JWST; working towards Solar Orbiter, Euclid, Plato, JUICE, Athena etc. – busy times.
- Supporting Gaia data exploitation as well as all recent missions with UKSA interest
- Planning JSWT Public Engagement programme with UKATC
- Position on small satellites – CubeSats, TWINKLE etc. less clear
- STFC providing resource to mission groups to foster networking, attending ESA meetings, science preparation.



Large Synoptic Survey Telescope

- £2.7 million for developments towards UK data centre and science exploitation; £15 million for buy-in on behalf of UK community to LSST data from start of operations



- Discussions underway to coordinate data centre functionality across other large new projects – dependent upon future capital funding



Other investments

DESI - development of optical fibre system and optical corrector

- £2.4 million; UK buy in for four years to DESI for the Mayall Telescope
- Awards to Portsmouth, Durham and UCL
- Working with NSF and DOE in US

MOONS - an instrument for use on the ESO VLT

- £5.9 million; awards to UKATC and Cambridge
- A UK-led project with six other international partners

DKIST - detector development for the Daniel K. Inouye Solar Telescope in Hawaii

- £2.7 million; consortium consists of UK academic institutions and industry

NGST - £1.4M for construction and operations, led by Warwick, Leicester

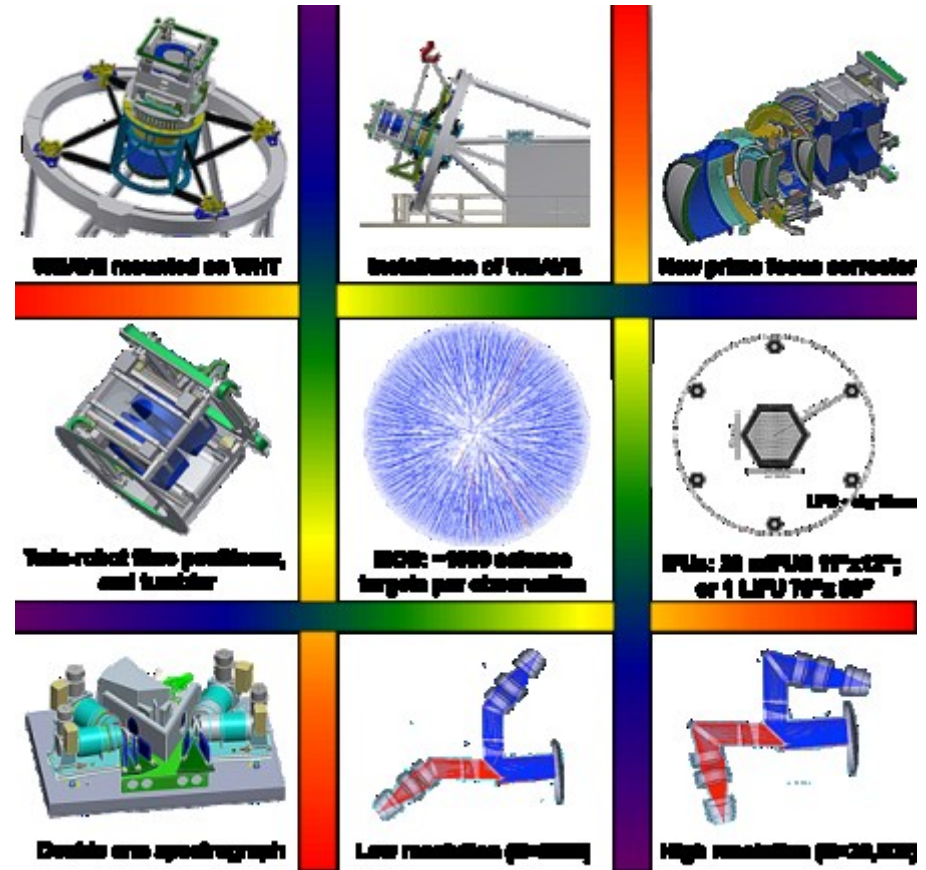
HARPS3 - currently under review, led by Cambridge and Exeter

SOXS - £0.1M provided to QUB in project led by Italy on NTT, La Silla



Projects

- Ownership of ING transferred to Spain (IAC), but STFC will continue to operate the facilities, focussing on WEAVE
- Early science from LOFAR at Chilbolton demonstrating its potential – support renewed
- Wide Field Units (CASU/WFAU) and ALMA Regional Centre - support renewed
- Early contacts on LT2, EST, Large wide field MOS (bigger than 4m diameter), GoTo



WEAVE



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Networking

- Number of UK groups involved in Opticon, Radionet, Solarnet, Europlanet – significant EU investment in astronomy, particularly transnational access and technology R&D
- Astronet being re-launched supported by Agencies – will support European Strategy development, working with ESA, ESO, APPEC etc.
- Newton Fund – number of astronomy proposals supported (VLBI, LT) or in review (Mexico, Chile)



How does Exoplanet Research fit in?



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STFC Exoplanet science review panel 2014-15



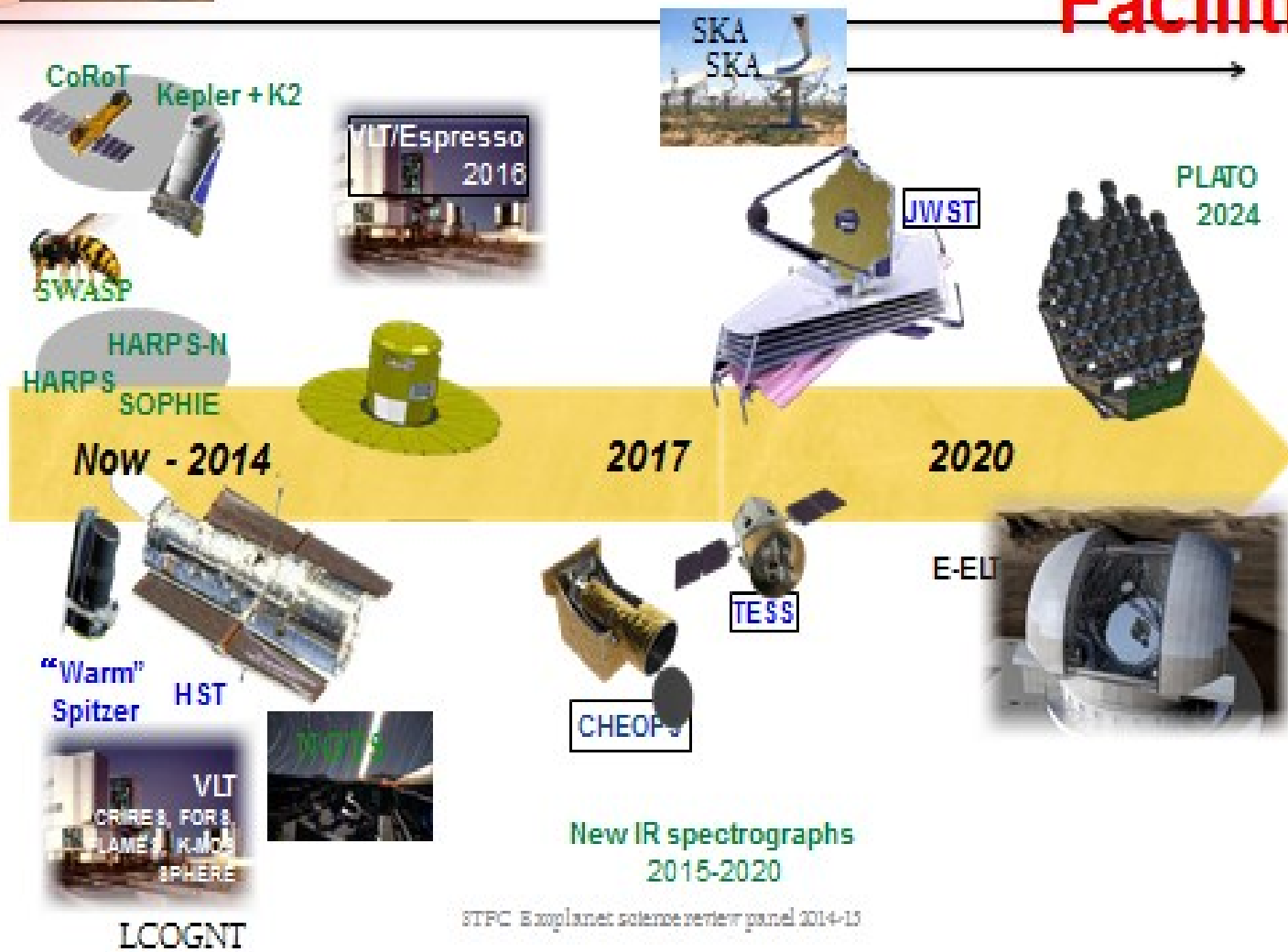
Paul O'Brien (Leicester, Chair)
Chris Arridge (Lancaster)
Stephen Lowry (Kent)
Richard Nelson (QMUL)
Don Pollacco (Warwick)
David Sing (Exeter)
Giovanna Tinetti (UCL)
Chris Watson (QUB)

Exoplanet Science Review

- The remit was to develop a coordinated strategy for UK involvement in exoplanet research that could enhance UK leadership in this area, taking into account the outcomes from previous reviews.
- Report to Science Board – for them to feed in to strategic decisions in STFC and UKSA



A time line of Exoplanet Facilities



STFC Exoplanet science review panel 2014-15

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Review Panel conclusions

4 main aims:

Aim 1: Support of the Transit Roadmap. With the selection of the ESA M3 PLATO mission, Europe now has an exoplanet roadmap that stretches into the 2030's. The backbone of this is transit detections and their applications (e.g. atmospheric studies). Throughout this period we see the science moving towards understanding the characteristics and evolution of terrestrial planet systems.

Aim 2: Develop a better understanding of Planetary Atmospheres through observations and theoretical research. Around the transit roadmap are common user facilities that have spectroscopic instruments capable of detecting planetary atmosphere signatures.

Aim 3: Understanding the structure of disks and the formation and evolution of planetary systems. Beyond detecting planets and understanding their physical properties (e.g. bulk compositions, atmospheric dynamics and chemistry), a major science goal is to understand planet formation and planetary system evolution.

Aim 4: Determine the frequency, mass distribution and origins of orphan and cool planets.

So what next?

- Already committed to many projects with Exoplanet capability but open to proposals (SOI, PRD etc.)
- Need to secure funding for and confirm DiRAC III
- Need to address / reverse impact of flat cash funding on grants
- Need to explore additional funding streams



What are the pressures and opportunities?



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4 March 2016

Jo Johnson announced high level numbers for each Research Council, UKSA, HEFCE and National Academies

- Met Chancellor's promise: total science budget protected against inflation
- £2,082 million in resource and capital allocation over four years 2016-20
- 2016-17 and 2017-18 are firm allocations – the rest are indicative pending the implementation of the Nurse Review
- Means a SR in 2017 to establish budgets for 2018 onwards



Allocation of science funding

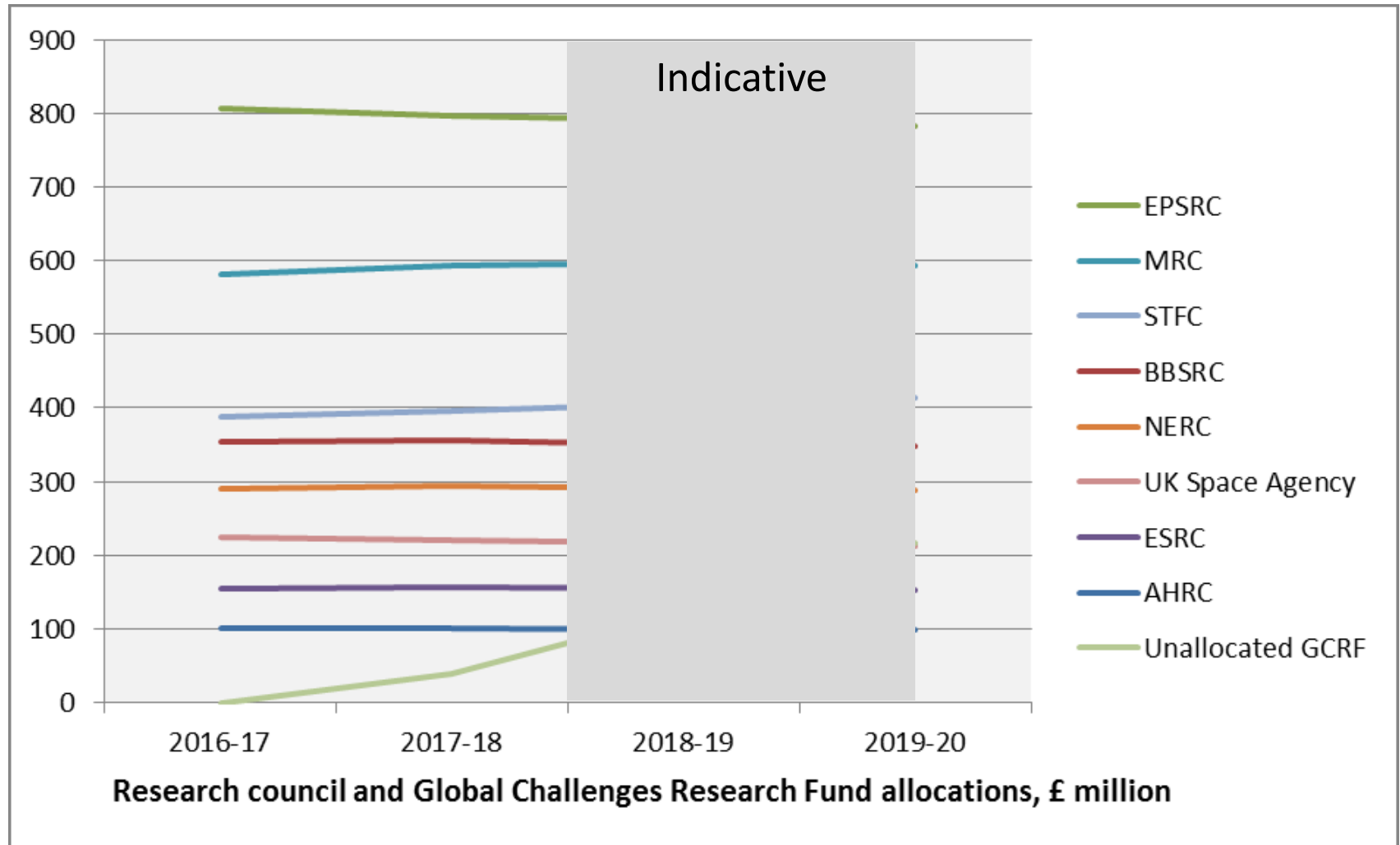
- Allocation booklet not entirely clear
- Capital listed under two headings
 - “World Class Labs” which roughly covers existing capital
 - “Grand Challenges” not itemised but covers new capital projects
- Research Councils have secured a lot of money but we do have challenges
 - Pressures mean that Research Councils received roughly flat cash for their core programmes through combination of resource funding and Global Challenges
- £700m of Global Challenges Research Fund (GCRF) remains unallocated between 17/18 and 20/21
 - Must be ODA compliant so some clever thinking will be required

RCUK strategic priorities booklet

- RCUK published its strategic priorities on 18th March
- Each Research Council set out its own high-level spending plans
- STFC's include pledges:
 - An excellent programme in particle physics, nuclear physics and astronomy
 - CERN, ESO, ESRF, ILL and FAIR, plus CERN technical upgrades, E-ELT and LSST
 - New commitments: ESS, XFEL and SKA
 - Operate and upgrade Diamond, ISIS and CLF
 - Increase innovation output from our funded activities
 - Skills programme to link traditional STEM with software engineering, technology development, and data science
 - Strong programme of public engagement



Research Council allocations



GCRF = funding for research into global challenges

What it means for STFC

- Overall position
 - Partitions have been retained
 - Another 4 years of flat cash will obviously impact the volume of the programme
 - BIS worked with us behind the scenes to address specific issues
- Core
 - Resource: flat from 2016-17 onward
 - Capital: flat for first three years, reduced in final year
- International subscriptions
 - Resource: sufficient for existing and new commitments - SKA, ESS and XFEL
 - Capital: sufficient for existing and new commitments
- Facilities
 - Resource: inflation indexed but need for efficiencies and/or generate additional revenue in later years
 - Capital: inflation indexed



Science Board input

- Already planned a balance of programme exercise this year for the PPAN programme
- Exact form of this review to be discussed at April Science Board meeting
- Likely a sub-group of Science Board including appropriate non-core members to get the correct expertise
- Will include consultation with community
 - Probably via Advisory Panels
- Not same process as in the previous programmatic reviews, we may well wish to ask more targeted questions



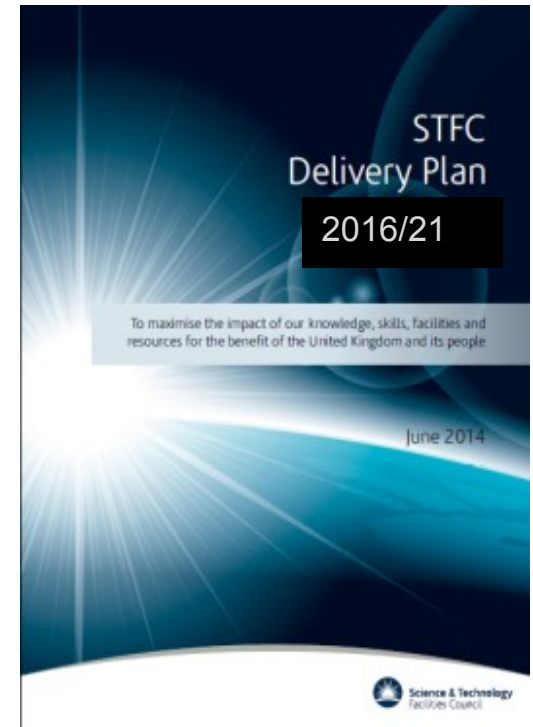
Grand Challenge Research Fund

- £3.5m p.a. allocated to STFC - will be managed by our Programmes Directorate
 - Needs to fund ODA compliant activities
- £700m of GCRF yet to be allocated until 2021 with £38m for 2017/18 alone
 - Also (separately) there will be an extension and significant uplift in the Newton Fund
- Programme still being designed
 - Currently unsure where the funding will held and the process of disbursement
- BIS keen to ensure all ODA compliant work is properly considered, including opportunities to fund existing work
- Call(s) likely later in 2016 for spend to start in 2017/18



What next?

- Community meetings from end of March
 - Particle Physics IOP meeting 23/3
 - Nuclear Physics 31/3
 - RAS Astronomy Forum 7/4
- STFC Staff Forums from 11 April
- Starting to work up our Delivery Plan – publication was initially suggested for mid-April, probably later



Prospects for Exoplanet research

- Continue to support broad range of facilities and be part of international capabilities
- Continue to press for more grants funding and enhancements to fellowships / studentships
- Recognise the large role played by ERC
- Unlikely to be 'significant' new core funds for new stuff
- Need to explore other opportunities (GCF)
- Need to advertise success at every opportunity

