Science & Technology Facilities Council

STFC HEPP-APP Town Meeting

Professor John Womersley
Chief Executive

9 April 2014


Spending Review
Programmatic Review

STFC's Spending Review outcome

- Chancellor announced BIS's overall settlement for 2015-16 back in June 2013
  - Flat cash for science (compared with - 10% for others)
  - Only areas to do better: intelligence services, NHS and DFID
- Allocation of individual councils budgets took until February 2014
  - Issues in non-science areas; discussions at the ministerial level; 2014-15 budget also potentially affected
- Good news - science ring fence intact and 2014/15 settlement untouched
- Even better news – STFC allocation for 2015-16 very positive
- Less good: HEFCE funding for teaching cut
  - QR research funding is flat

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Spending Review outcome

- Sufficient resource to run the International Subscriptions and UK Large Facilities
- Increased capital allocation recognising that STFC is a capital intensive organisation
- We may secure some of ‘Newton Fund’ £75 million for ODA activities

BUT

- Flat cash Resource funding for the Core Programme for a fifth year
- Administration budgets likely to be cut further and deeper

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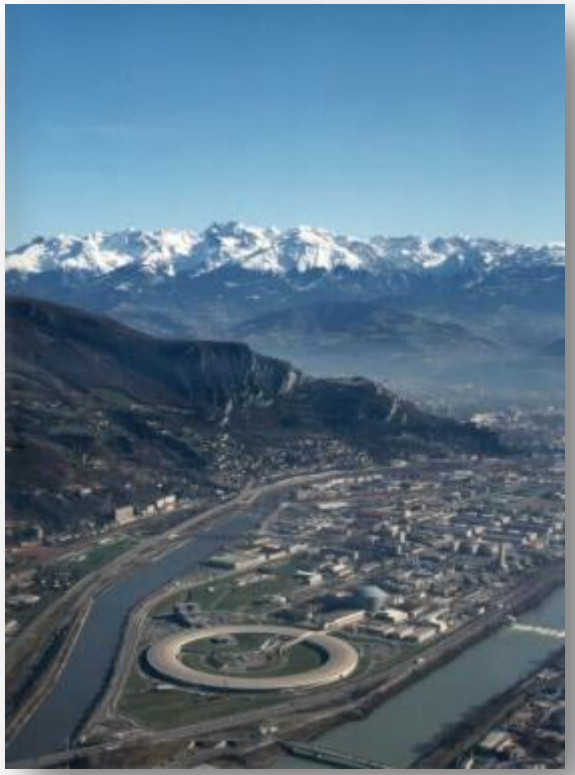
STFC's allocation 2015-16

		Original 14/15 baseline £m	15/16 allocation £m	% change
RESOURCE	International Subscriptions	123.1	127.5	3.6%
	UK Large Facilities	89.5	107.4*	12.29%*
	Core Programme	172.2	165.1*	-0.1%*
CAPITAL	International Subscriptions	27.7	27.3	-1.4%
	UK Large Facilities	45.4	48.5	+6.83%
	Core Programme	14.2	53.3	+275%
	Total	**472.1**	**529.1**	**+12.1%**

*Reflects a £6.9 million reassignment of corporate overheads from Core Programme to the UK Large Facilities

International Subscriptions

- Resource allocation - £127.5 million (flat cash plus £4.5 million)
  - Provision for all international subscriptions at current level plus
    - Anticipated CERN contribution factor of 14.3% in 2015/16
    - EUR 825k for ILL nuclear insurance in 2015/16
- Capital allocation - £27.3 million
  - Includes provision for E-ELT capital £1.33 million
- Current net position covers currently forecasted costs
  - This could change either way



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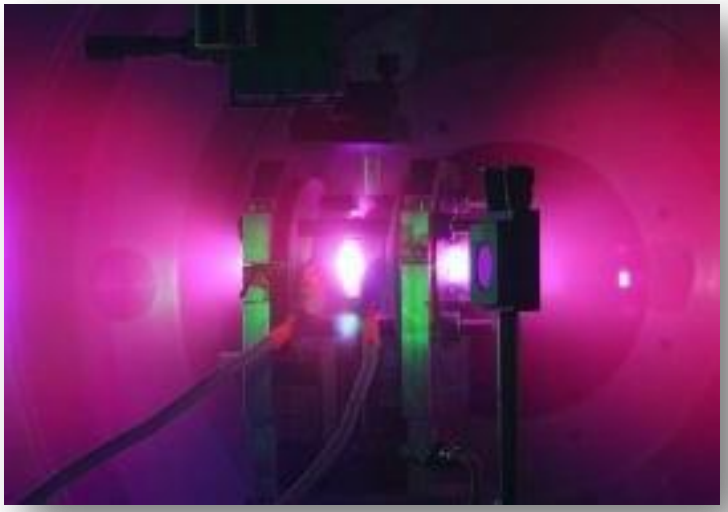
UK Large Facilities



- Resource allocation of £107.4m (flat cash plus £11m)
  - Other RCs agreed £2m for Lasers
  - Sufficient to run Diamond 200 days, ISIS 120 days, High Power Lasers and Lasers for Science Facility (110 and 100 user weeks respectively)
- Capital allocation - £48.5 million
  - £3m over flat cash but still £6m less than fully sustainable capital funding

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Core Programme

- Resource allocation of £165.1 million – flat cash
  - Will need to develop a prioritised programme for all areas of Core Programme using Programmatic Review and other inouts
- Capital allocation of £53.3 million
  - Includes £14.2 million provision for core programme as CSR10
  - Specific commitments, £4.1 million Higgs Centre and £7 million Regional Growth Fund award
  - Capital could relieve some of the pressure caused by resource shortfall

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Higgs Centre for Innovation

- Autumn Statement included £10.7m capital for construction
  - Business incubation centre and start-up support, exploiting UK ATC capabilities in instrumentation and big data
  - Partnership with Edinburgh University, will host 12 SMEs, as well as academic and PhD posts
  - Higgs Centre and UKATC capabilities will support the new Strathclyde-based Centre for Excellence for Satellite Applications

"The Centre will enable us to build on our strong research base and play a major role in helping to bridge the so-called 'valley of death' between the lab and the market place." (Rt Hon David Willetts MP, December 2013)

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Programmatic Review

- Programmatic Review was published on 26 March
  - Please send us your feedback/input – email to: *review@stfc.ac.uk*
- Financial annexes redacted
- Will guide preparation of 2015-16 programme
  - Aim for approval by STFC Council in May
- In the longer term, Review will underpin our programme plans including the Spending Review to be undertaken by the next Government
- Presentation by Science Board chair later today

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Guiding principles for 2015-16

STFC Council agreed on 25 March:

- This is a one year allocation and a flat-cash rollover year – Ministers do not expect to see any dramatic changes
- We will work for a better-than-flat-cash settlement in the next CSR (for 2016-17 to 2020-21); but we cannot depend upon it
  - Unwise to make commitments on anything other than a flat cash settlement for these four years.
- We will seek to maintain existing levels of support, avoid committing to new things in advance of knowing 16/17 allocations but also avoid precipitate withdrawals

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BIS Capital Consultation

- Spending Review increased capital from £500 million p.a. in 2014/15 to £1.1 billion p.a. in 2015/16 and through to 2020/21
- BIS to launch formal consultation in April on priorities to 2021
- Will ask two questions:
  - Balance between capital spend on 'small', regional investment relative to large scale inter/national projects?
  - Priorities for UK investment in large projects? (either UK or international)
- Consultation document will have many STFC examples of opportunities and new projects. Not prioritised!
- Part of a larger Science and Innovation Strategy to be published in the Autumn
- Advisory panels to feed in

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£300m investment in science

- David Willetts at Jodrell Bank, March 11th
  - £165M for the European Spallation Source
  - £119M for Square Kilometre Array (secure the HQ at Jodrell Bank)
  - £25M for the ESA PLATO mission
- Huge vote of confidence in basic science and in STFC

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ESS and SKA

European Spallation Source (ESS)

- 10% contribution to project
- aim for 70% to be ‘in kind’
- Sweden contribute to ISIS costs
- Internationalisation of ISIS

Square Kilometre Array (SKA)

- £19m already committed over four years to support design of the SKA project
- £100 million as UK’s 15% of construction cost of SKA phase 1
- Goal of securing the headquarters of the future international SKA organisation

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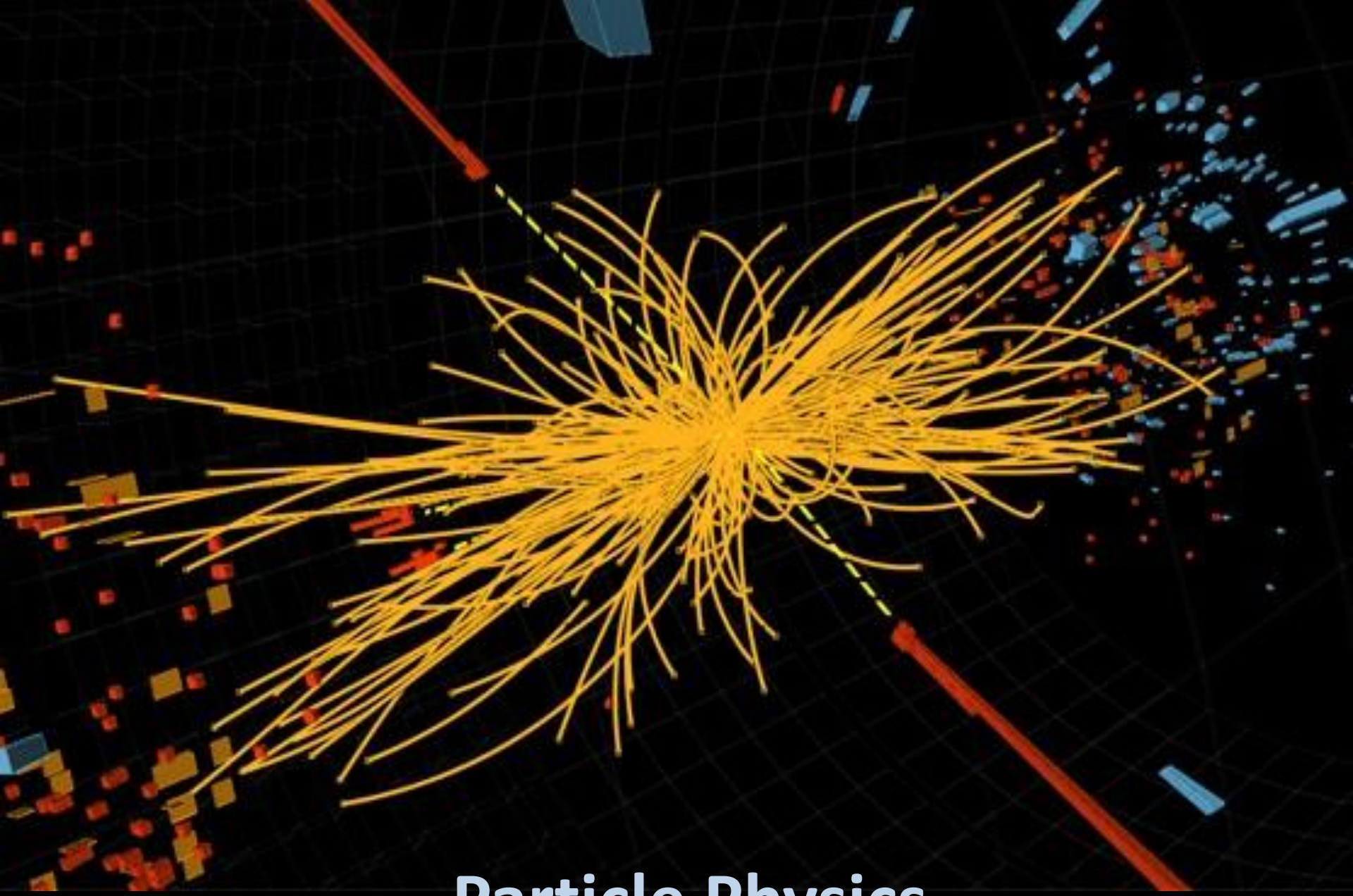
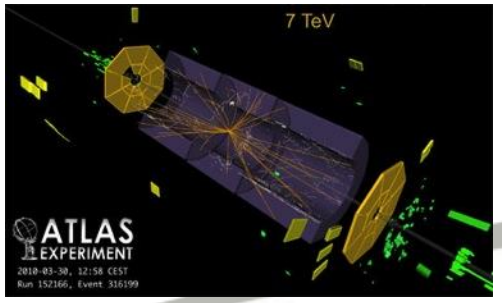


Particle Physics

Particle Physics

- Our highest priority in particle physics remains the exploitation of the **Large Hadron Collider (LHC)** at CERN.
  - ATLAS, CMS and LHCb (and ALICE) experiments.
  - Worldwide LHC Computing Grid (via GridPP)
- We have agreed funding for Phase 1 upgrades for ATLAS and CMS and next phase of R&D towards the HL-LHC
  - Phase 2 upgrades needed but cost and schedule a concern
- Funding for LHCb and Phase 2 ATLAS/CMS upgrades needs to fit within emerging funding envelope following Programmatic Review
  - Some further tensioning required across the upgrades



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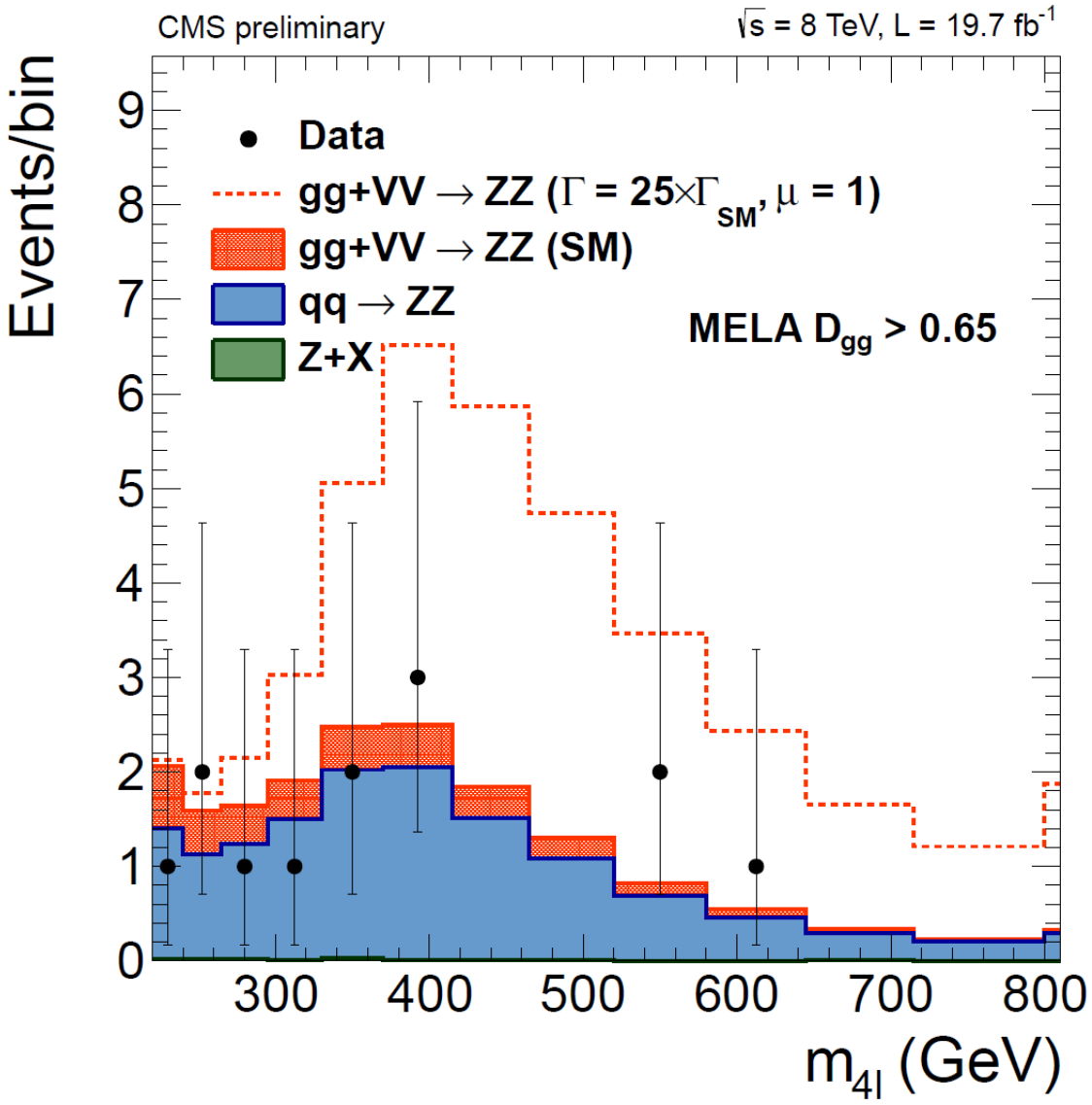

Red dashed line expected for 25 x SM width and SM production cross section

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Particle Physics

- Exploring neutrino mass and mixing with **T2K**, **SuperNEMO and SNO+**
  - T2K is world leading experiment for the study of neutrino oscillations
  - Supporting SuperNEMO demo phase - neutrinoless double-beta decay.
  - Supporting SNO+ demo phase - Oxford candidate isotope (130Te).
- Engaging in future opportunities for a **next generation long baseline neutrino experiment**
  - Strong science case recognised in European Strategy for Particle Physics and given a high priority in STFC Programmatic Review
  - Preparatory phase proposal invited for possible future participation in the Long Baseline Neutrino Experiment (LBNE) at Fermilab, Tokai to Hyper-Kamiokande (T2HK) at J-PARC and R&D for the UK-led water Cherenkov CHIPS project.

Joint $\nu_\mu + \nu_e$ Analysis: Constraints on δ_{CP}

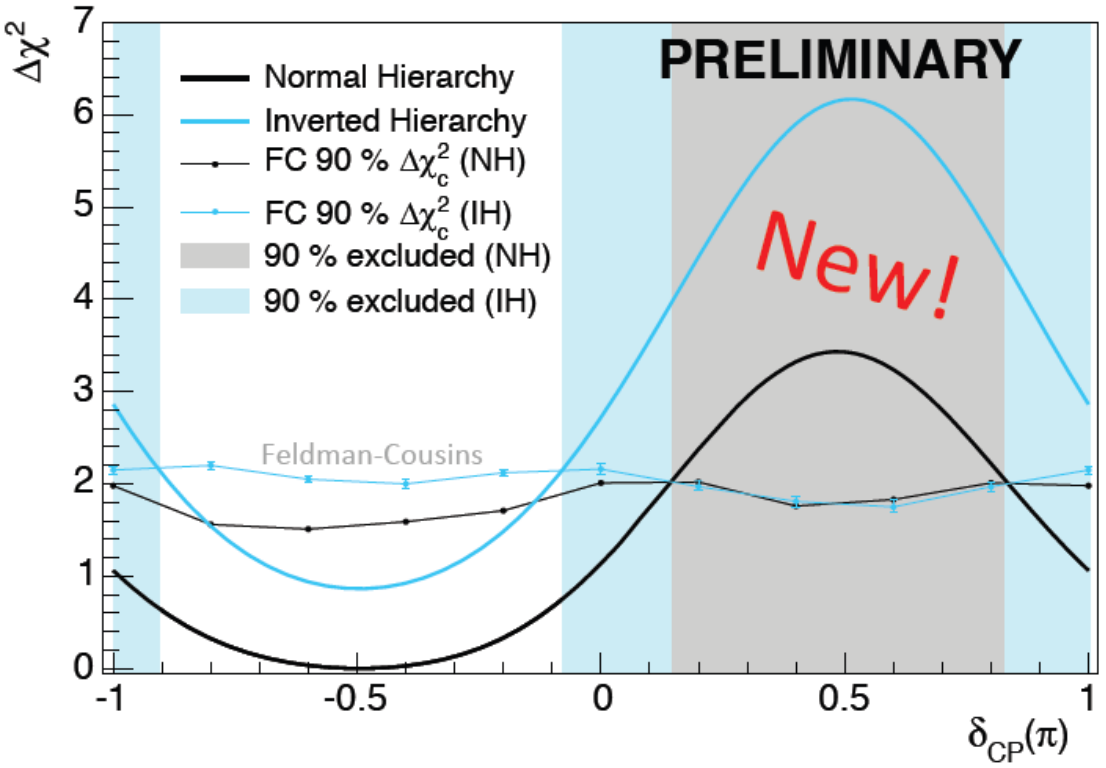
Likelihood ratio fit to both $\nu_\mu + \nu_e$ event samples

Accounting for correlations in the parameter space

$(\theta_{23}, \theta_{13}, \delta_{CP}, \Delta m^2_{32})$

Including constraint from reactor experiments *Daya Bay, RENO, Double Chooz*

$\sin^2 2\theta_{13} = 0.095 \pm 0.010$ (PDG 2013)



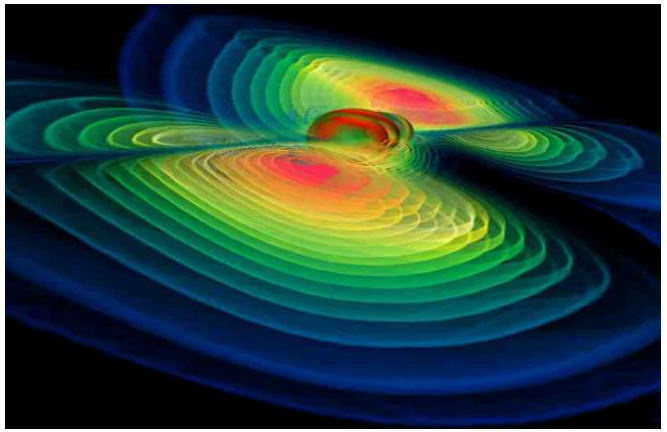
	90% CL Inclusion
NH	$\delta_{CP} \in [-1.18, 0.15]\pi$
IH	$\delta_{CP} \in [-0.91, -0.08]\pi$

PRELIMINARY

T2K hints toward $\delta_{CP} = -\pi/2$

Particle Astrophysics

- STFC is supporting direct detection of gravitational waves from distant cosmic phenomena
  - Exploitation of ground-based Gravitational Wave Detectors
  - Advanced LIGO (incl. LIGO-India)
  - LISA pathfinder - ready to go
- Exciting and potentially historic measurement of ‘primordial’ gravitational waves by BICEP2
  - Has huge implications but more work to do!



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Particle Astrophysics

- Pre-Construction Phase of **Cherenkov Telescope Array**
  - Funding for 3 year R&D programme for CTA (to March 2015)
  - UK in strong position to lead high-energy part of CTA in construction phase and ensure future access to data for the UK scientific community
  - CTA Project Scientist and Project Manager both from UK
  - Site Selection decision soon
- **Dark Matter** also strategically important area of research for UK
  - Focused R&D support being provided by STFC (to March 2015)
  - DMUK community targeting Lux-Zeplin second generation experiment using noble liquid detector technologies.
  - Awaiting outcome of P5
- Working to see if we can support significant involvement in both

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Review of UK Phenomenology

- Mid-term review of IPPP in 2013 confirmed IPPP has made very positive impact on UK programme
  - Instrumental in rejuvenating phenomenology in the UK
- But Panel also agreed it's appropriate to consider future ways to support phenomenology
  - Especially if flat cash funding is to continue
- Panel recommended STFC undertake a strategic review of UK phenomenology in 2014/15
  - Review planning will begin soon
  - Will include community consultation

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CERN

- LHC consolidation and upgrade programme is on track
  - Re-start of physics programme in April 2015
- Over the last three years UK companies have won £47 million in contracts from CERN – up 52%
- CERN BIC in new Campus Technology Hub at Daresbury

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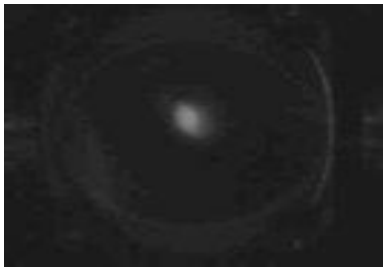
Accelerator R&D

- VELA is operational - first commercial users booked with more in the pipeline
- CLARA CDR completed
- MICE - Step IV on track



Accelerator R&D

- STFC's Accelerator Strategy Board (ASB) instigated a 3-yearly cycle of accelerator reviews of STFC funded R&D
  - Initial review completed in 2011/12 and next review scheduled for 2014
  - Science Board recently endorsed ToR for review in line with the recommendations from the Programmatic Review
  - This will look at strategic scale and balance of programme, but not construct a detailed budgeted plan
- MICE remains a high priority
  - Ken Long (IC) elected as international spokesperson
  - Step IV on track for completion Feb 15
  - Key decisions needed by 2016 on best way to complete the project
  - Will be taken by the international Funding Agencies after consultation with the collaboration

ELI-NP Gamma Beams contract

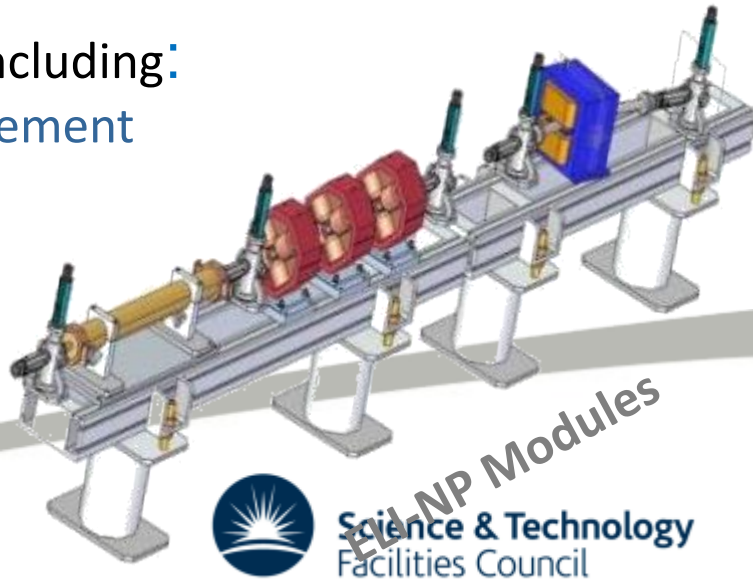
- **STFC wins €5.5 million**
  - Laser-based Nuclear Physics pillar will focus on high intensity laser-based nuclear physics.
  - ELI-NP will generate radiation and particle beams with much higher energies, brilliances suited to studies of nuclear and fundamental processes.

- **Gamma beams part of the project is about €66.9 million**

ASTeC and Technology will deliver a work package including:

- Vacuum specification and hardware procurement
- Magnet specification
- Engineering CAD design
- Assembly and test of accelerator modules and power supply and control racks

~17 FTE over 4.5 years



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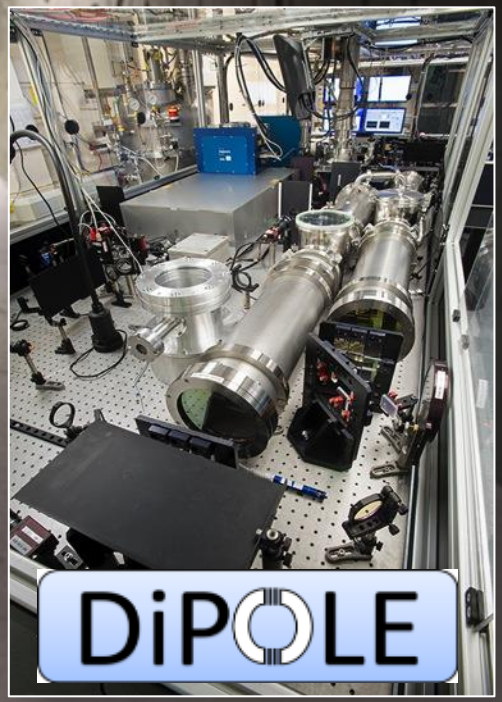
X-FEL (re)engagement

- EPSRC and STFC will jointly fund the construction and deployment of CLF's DiPOLE laser technology to the European XFEL in Hamburg
- The £8 million laser will be installed on the XFEL High Energy Density beamline in 2017



RAL Particle Physics Department

- Implementing recommendations of PPD review
  - 8 joint appointments in place, 3 more in final stages of negotiation.
- Reviewing future plans in light of Programmatic Review
  - Need discussion with Group Leaders and PIs
  - Arranging a meeting in the near future
- Graduate students starting autumn 2015 can allocate PPD "academic" staff to university groups
  - Understanding additional quota students those groups receive will be joint students with PPD
  - Interested in discussing this arrangement with groups

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RAL Particle Physics Department

- Arranging course in FPGA programming intended for graduate students
  - Postdocs too if there is room, we have 20 slots

- Four-day residential course at Cosener's/RAL
  - Provisionally the end July
  - Will be two days instruction on VHDL and two days on Vivado
  - RAL will provide the course but there will be a charge for lodging.

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Consolidated Grants

- PP Theory consolidated grants review in 2013 for grants commencing October 2014: outcome delayed due to Spending Review
  - Able to announce majority of institute grants and PIs informed of posts to be funded if expected funding became available
  - Funding now known and remaining grants proceeding to announcement
- PP Experiment consolidated grants review 2015
  - Planning for the 2015 consolidated grants round will begin shortly
  - Timetable expected to be similar to last round
  - To be confirmed at grant-holders meeting in the early autumn.
- Review of implementation of Consolidated Grants Mechanism now getting underway

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Consolidated Grants Review

- Consolidated grants introduced across particle physics, nuclear physics and astronomy following 2010 review
- Aim to find the best way to support continuing science exploitation in universities and other research groups
- Transition is now complete so timely to review the implementation
  - Are there outstanding actions from the 2010 Review?
  - Any unexpected/adverse consequences from implementation?
  - Are there differences in implementation between grants panels, if so why?
  - Can improvements be made while still supporting the original aims?

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Review membership

- Chaired by Prof. Alan Heavens, Imperial (Science Board)
  - Includes reps from Science Board, 2010 review, grants panels, programme managers

- Survey sent to PIs in Feb/March; communities given opportunity to provide direct feedback if survey route not possible
  - Input from grants panels, relevant STFC staff and committee members
  - Meetings in May, report to Science Board in July

- Please ask questions/make comments in the Q&A session
  - Mark Lancaster and Silvia Pascoli are here and happy to take feedback

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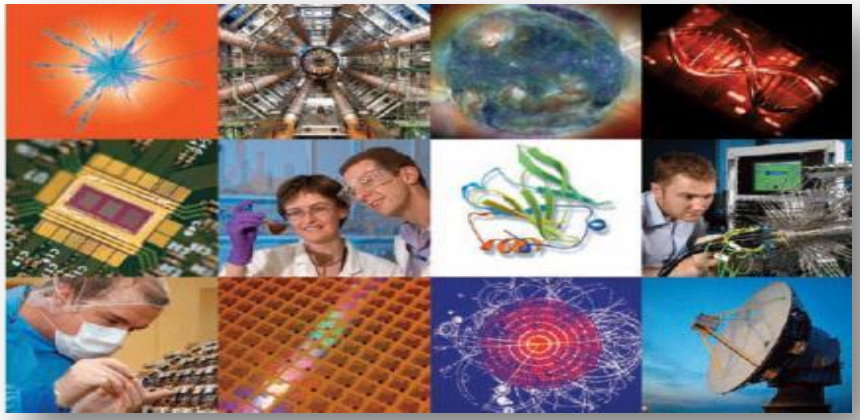
Vacancies on STFC Panels



The 2014 call for applications and nominations is open

- We are looking for outstanding individuals to become members of STFC's committees and panels
- Visit the STFC web site to apply or to nominate a colleague
- Closing date 25 April

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What
to do
next

What have we done so far?

- Maintained and grown positive relations with our communities
- Developed clearer sense of ‘who we are and what we do’
- Contributed to a positive public attitude to basic research
- Positioned STFC as a ‘thought leader’ in areas like impact
- Managed flat cash without crises
- Refreshed our science programme (e.g. E-ELT, FAIR, ESS, SKA)
- Trusted delivery partner for major investment on Campuses (e.g. Hartree Centre at Daresbury)
- Developed clear messages and evidence base for policymakers
- Made a convincing case for funding

Oh, and discovered the Higgs boson …

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“The achingly glamorous world of big science”

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Science and Technology Facilities Council
Annual Report and Accounts 2012-2013

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RESEARCH IS GREAT BRITAIN

The Large Hadron Collider
CERN

UK scientists built crucial parts of the Large Hadron Collider at CERN that re-creates the conditions one trillionth of a second after the Big Bang. For world-class research expertise, choose the UK.

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STFC Impact Report 2013

- Supporting UK space industry (worth £40 billion by 2030)
- CERN technology benefits to the UK economy
- New vaccine for foot and mouth disease
- New method for breast cancer biopsies
- Tenant companies at Sci-Tech Daresbury, delivered £35 million sales, attracted £63 million of investment and developed 147 new products
- Two million people reached last year in face to face engagement including 346,000 school children and 17,500 teachers

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Reducing Engineering Stress

Rolls-Royce generates annual sales of £5.7b and supports 1 in every 300 UK jobs.

RR has worked with STFC for decades to address engineering challenges such as foreign object damage, which costs the industry ~£4 billion a year, and mapping stress within engine welds


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Physics technology saves lives

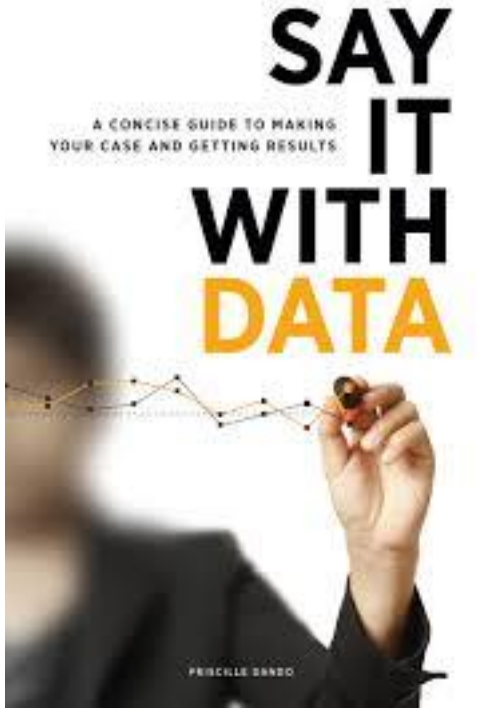
- 2.3 million MRI examinations in England each year
- In 2010, the MRI industry supported 2,200 jobs and contributed £111m to UK GDP
- Rutherford Cable, invented for particle physics, enabled the development of MRI:
  - Key technology for today's high-resolution MRI scanners
  - 20,000 scanners worldwide
  - 50 million examinations every year
  - Multi million £ market for UK companies such as Oxford Instruments

Science & Technology Facilities Council

- **8.3%** increase in applications to physics degree courses
- **46.5m** estimated total audience reached by STFC Public Engagement schemes since 2006

ResearchFish Update

- 2014 submission period closed 27 March
  - Submission rate 51%
  - >15000 outputs added to 1371 awards
- Data will be cleaned and fed into Gateway to Research (GtR)
  - Data display not optional – we are required to
  - ResearchFish is only route for outcomes to be displayed on GtR; Non-submission means no outcomes showing
- Data will be analysed and reports created
  - For BIS, Council, EB, programme managers, institutions
- Working towards improved, cross-Council solution



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Making our case

We are doing very well!

but…

- General Election coming
  - Expect a 4-year spending review in June 2015
- How can we make a visible difference to the UK?
  - Economy, STEM skills, industrial strategy
- How do we convince others to tell our story?
- The breadth of STFC's programme is a strength
  - How do we maximise these benefits?
  - And how can increase the impact of all our programme?

We need your help and input!

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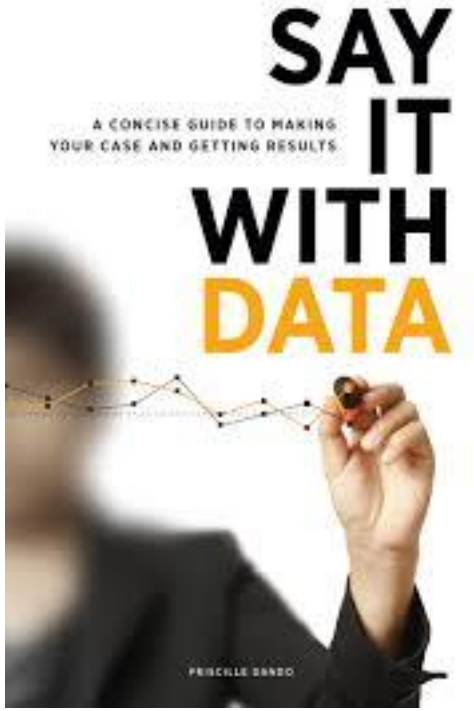

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Stakeholder relationships

Making our case

We are doing very well!

but…

- General Election coming
  - Expect a 4-year spending review in June 2015
- The breadth of STFC's programme is a strength
  - How do we maximise the synergies and benefits?
- We need you to
  - Keep doing excellent science
  - Get the messages out to the public
  - Help convince others to tell our story
  - Engage a broad political spectrum
  - New ideas!

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Science Board

Professor Matt Griffin
Cardiff University
(outgoing chair) Science Board

9 April 2014

Discussion


SCIENCE & ENGINEERING WEEK
Science & Technology Facilities Council
www.stfc.ac.uk
is playing a leading role in the world's biggest scientific experiment
the Large Hadron Coll
CERN in Geneva - recre
the conditions tha
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SCIENCE & ENGINEERING WEEK