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Particle Physics Theory Town Meeting 2015

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On behalf of John Womersley

December 2015

Review of Phenomenology

- A strategic review of UK phenomenology has been carried out to advise the STFC Executive on the future STFC support.
- The UK theory community was asked for their input and to identify the excellence, impact, and leadership of their work.
- Input was also provided by the UK experimental community, international experiments and international theory groups.
- The review panel made its recommendations to Science Board in October 2015.

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Panel findings

- UK Phenomenology programme is aligned with the UK Particle Physics priorities achieving a good balance between world leading science and maintaining breadth of programme.
- UK community competes successfully internationally and is world leading in several areas, e.g. Parton Distribution Functions (PDFs), Monte Carlo event generators (MCs), Precision QCD physics and Lattice QCD.
- The IPPP has made a positive impact on UK phenomenology, supports the particle physics community and has a very impressive research programme of its own.
- Phenomenology community trains highly skilled PhD students and has a high level of national and international impact.

Recommendations

The review made three key recommendations:

1) Retain a national centre for phenomenology but tension the responsive mode component of its research funding with the rest of the particle physics theory programme.
2) STFC invites the IPPP and other institutions to bid to run the national centre after 2018, if it were possible for STFC to award a long term grant.
3) STFC reviews the balance and level of funding for particle physics theory in general.

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Implementation

- The IPPP will be invited to submit a proposal to the 2017 consolidated grants round now getting underway. The arrangements for this transitional grant period are being discussed.
- After considering the arguments both for and against, STFC does not intend to retender at this time and will negotiate the continuation of the IPPP at Durham.
- The balance of programme and level of funding for particle physics theory will be considered as part of the next STFC Programmatic Review.

Scientific Computing

Workshop on the UK-Tier Zero (UKT0) initiative in Oct 2015

- UKT0 brings together STFC projects
  - Better use of existing computing capacity
  - Develop common approaches to future capacity
- Over 50 representatives from across the STFC programme including:
  - Low Frequency Array, Large Synoptic Survey Telescope, Laser Interferometer Gravitational-wave Observatory, EUCLID - an ESA astronomy and astrophysics space mission, Square Kilometre Array, Lux-Zeplin, Diamond, the Large Hadron Collider and Distributed Research utilising Advanced Computing - DiRAC
  - Plus Culham Centre for Fusion Energy
  - Follow-on meeting planned in 4-6 months; we will advertise it in the near future.

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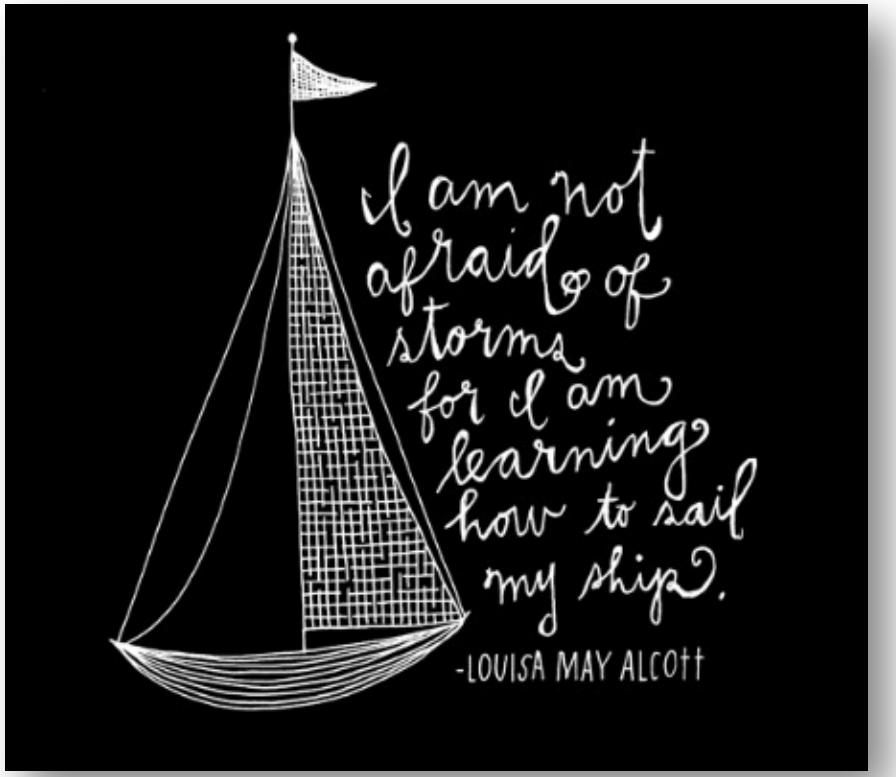
The challenge ahead

Our mission and organisation are being positively challenged

- Primary legislation prevented restructuring in the past
  - Now it is required to provide the new 'Office for Students' replacing HEFCE
  - Means related issues can be tacked on – all options are on the table



- Perfect storm over next six months - funding pressures, reform plus lots of people offering their solutions
- We did not cause the problem but cannot run from the storm

Spending Review

On 25 November the Chancellor announced the CSR results

- BIS funding for the four years 2016-2020
  - 17% cuts overall - less than feared
  - Science ring fence with a commitment to protect the budget in real terms
- Details have yet to emerge but Government has made the following commitments to science
  - £3.2bn flat cash for science, plus
  - £500m annual increase by 2020, to be achieved by establishing a £1.5 billion Global Challenges Fund using Official Development Assistance
  - Plus £6.9 billion committed capital until 2021

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Spending Review

BIS trying to work through what this all means

- BIS has yet to receive their letter from HMT
  - Lot of unscrambling to do
- Least certainty around Global Challenge Fund
  - Likely to start at £80m in year 1 and reach £500m by end of the period
  - Some earmarked for National Academies
  - Some may be used to fund existing activities in early years, some will be new activity and have to conform to ODA rules
- So 10% uplift by 2020 (equivalent to inflation) is very welcome, but there are many questions to be resolved

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Decisions on allocations

Government starting to think about allocations

- HMT announced funding for SKA and ESS
- BIS has worked up a methodology for allocating resource and capital between RCs that they hope will be “fair, robust and transparent”
  - We have submitted a lot of evidence and scenarios to BIS – they trust our advice and have accepted that there are no easy answers
  - BIS has asked us to develop further scenarios and are requesting data on facility funding
  - Unlikely we will receive our allocations before mid February
  - There is also a possibility that we will only receive a two year allocation pending the outcome of the Nurse Review
- Outlook is reasonably good but it is still all to play for . . . .

Green Paper on Higher Education

In November, Government published a Green Paper proposing reform of higher education

- Driver is the restructure of HEFCE
- Contains a short chapter on reducing complexity in research

- All subject to the recommendations in the Nurse Report but Implies consolidation of Research Councils
  - Asks should dual support be delivered in a single organisation or two?
- Planned legislative timetable – but the plan might change
  - White paper to be launched in March 2016
  - New bodies would be created April 2018
- Consultation period ends mid January

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Characteristics of our programmes

STFC provides strategy, planning and delivery of scientific infrastructure to deliver experiments and programmes; defining characteristics are:

- **Long-term** – scientific infrastructure projects that require decades to plan and deliver, are high risk and expensive - need long-term commitment and support
- **Challenging technology** – novel and complex technology needed to deliver the programme; either to answer a clear science question or apply the use of emerging technology to advance research in an area of study
- **Collaborative** – requires close partnerships between government(s), researchers and businesses – sometimes in an international context - to develop the idea, mobilise support, secure commitment and funding, plan the delivery and ensure full exploitation of the science

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Current system – types of project

UK has an organisation that is central to providing strategy, planning and delivery of scientific infrastructure; defining characteristics are:

- **Big kit for big science –** focussed programme and team, mission to pursue specific science question, sometimes can only deliver by international collaboration
  - Similar to putting a Man on the Moon
- **Big kit for small science -** focussed programme and team to utilise emerging technology for the benefit of science, develop and operate cutting-edge user facilities
  - Commitment to delivering consistent quality over several decades - users may not have long-term perspective

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Facilities and experiment spectrum

LIGO	CERN	E-ELT	Diamond
One long-term project	Three long-term projects	Tens of large projects at any one time	Thousands of small projects at anyone time
Team of 1000	Teams of 2,000	Teams of 20-50 Time for individual users	Teams of 5 -10 All proposed by individual users

Science exploitation, upgrades, project management,

Oversight, governance, advocacy, policy development

How we deliver

- Nurturing ideas from the community - encouraging ambition, collaboration and strategic approach
- Connecting people from different research disciplines to build the idea and grow consensus, encouraging expert contributions
- Build on the intellectual power of the community to help develop a compelling case and proposition for Government
- Managing the relationship with government and business on the communities' behalf - leading on advocacy and policy
- Create strong international partnerships to identify optimum opportunities to deliver UK needs
- Offering Government confidence in our approach to secure commitment and funding - professional, project management
- Holding the ring on risk on behalf of all stakeholders
- Takes a high degree of scientific, technical and intellectual insight to oversee and broker the development of ideas, planning, operation and exploitation of ideas

In the next 20 years:

- Science with LHC Upgrade, DUNE, ESS, XFEL
- Upgrades to our facilities – Diamond, ISIS, ESRF
- Vulcan 20PW
- Exascale machine at Hartree
- CLARA leading to construction of a UK FEL
- Astronomers combining data from JWST, E-ELT, SKA
- Detection of dark matter
- Gravitational wave astronomy
- Space missions – ExoMars, JUICE, comet sample return to Harwell
- Decisions on CERN machine to follow LHC
- ILL decommissioning
- Innovative detector technologies
- Significant growth on campuses
- Role in national science strategy
- Improved understanding of electroweak symmetry breaking
- New ideas about origins of dark energy and dark matter
- …?

No miracles required

- With your help and engagement, every bit of this vision is deliverable, including securing the resources needed.
- We must encourage the next generations to keep coming up with new ideas.
- Let's be ambitious!

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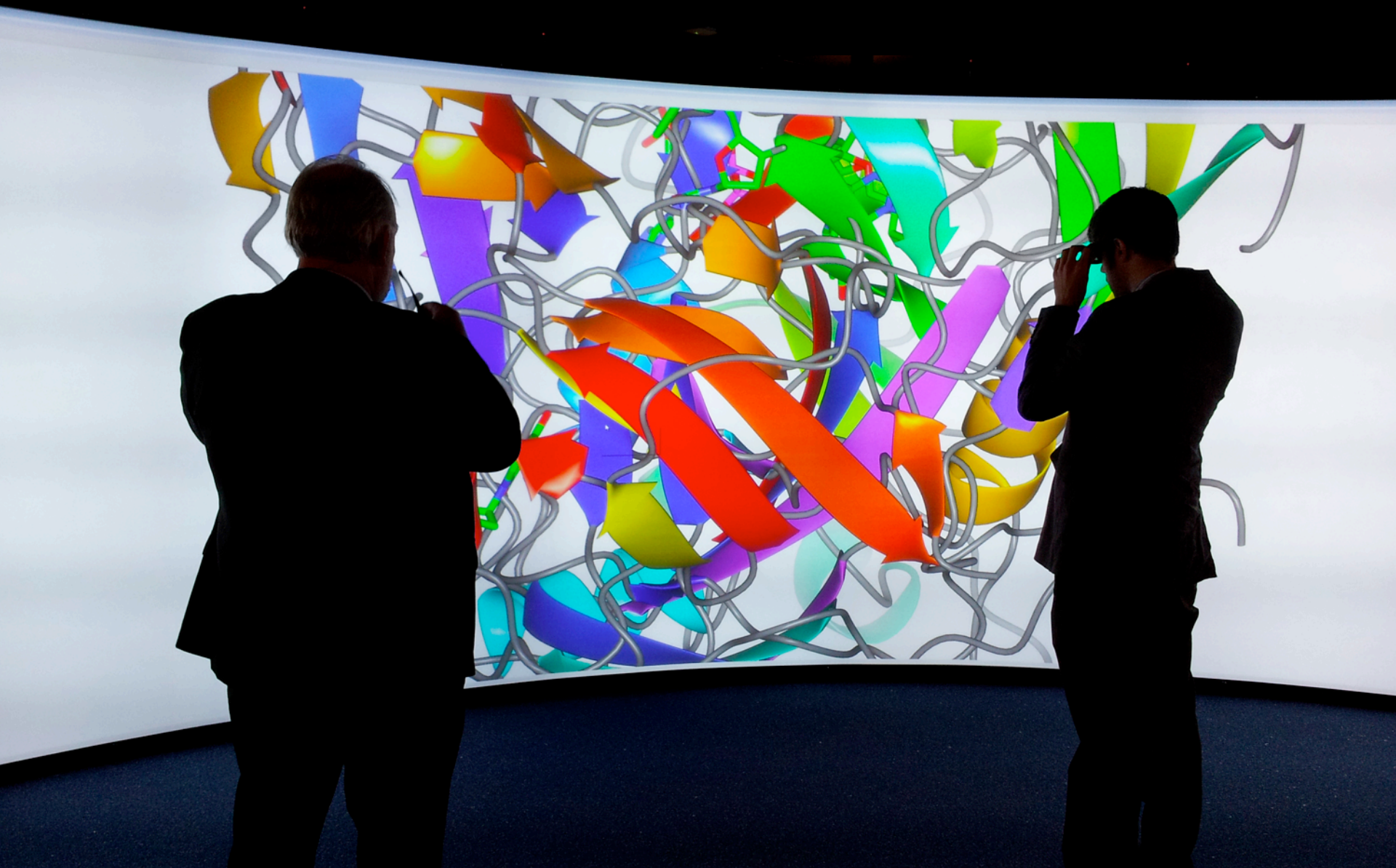
Discussion




Merry Christmas