Institution: Cardiff University

Unit of Assessment: 9 (Physics)

a. Overview

Research is organised into four groups (new appointments in the period are underlined):

Condensed Matter and Photonics (CMP): This is a new grouping, led by Prof Smowton and formed to exploit synergies in the previously small Photons and Matter and Nanophysics areas along with activities in Biophysics and THz optics. Critical mass and effective use of academic and infrastructure resources has been achieved with seven new appointments made in the past three years. Profs (P): Smowton, Langbein, Jesson; Readers (R): Williams, MacDonald, Matthai, Elliott : Senior Lecturers (SL): Buckle, Lynch, Read; Lecturers (L): Muljarov, Ladak, Giblin, Westwood.

Gravitational Physics (GP): Led by Prof Sathyaprakash, studies sources of gravitational waves and the development of algorithms for their detection. It is among the largest groups within the worldwide LIGO (Laser Interferometer Gravitational Wave Observatory) and British-German GEO 600 collaborations. (P) Sathyaprakash, Schutz (0.1); (R) Sutton, Fairhurst (RS University Research Fellow); (SL) Hannam (STFC Rutherford Fellow)

Astronomy (A): Led by Prof Eales this comprises two sub-groups: The Galaxies sub-group works on galaxy formation and evolution from high-redshift to the local Universe and the life cycle of dust and heavy elements, using radio to X-ray observations. The Star Formation sub-group uses major observatories to study prestellar and young stellar objects, and pursues a theoretical programme on star formation, protostellar disks, and computational radiative transfer. (P) Eales, Davies, Whitworth; (SL) Parise, Gomez, Cartwright; (L) Peretto, Papadopoulos (STFC Rutherford Fellow)

Astronomy Instrumentation (AIG): Led by Prof Gear, the AIG builds and exploits FIR-millimetre instrumentation for ground-based, balloon-borne and space-borne observatories, and for CMB studies, and is recognised by the international astronomy community as one of the world-leading groups in this area. It provides facility instruments (e.g., SCUBA-2, Herschel-SPIRE) and builds and deploys PI experiments (e.g., QUaD) in collaboration with UK and international partners. Doyle and Hargrave have been appointed as Lecturers. The AIG is also closely associated with a spin-out company, QMC Instruments Ltd., which markets products based on technology developed by the group. (P) Gear, Ade, Griffin, Mauskopf (0.2); (SL) Pascale, Tucker, Hargrave; (L) Doyle.

All groups are represented on the School Research Committee which is chaired by the Deputy Head and Director of Research, Prof Matt Griffin. The School of Physics and Astronomy is itself part of the newly created College of Physical Sciences and Engineering. The other schools in the college are Architecture, Chemistry, Computer Science and Informatics, Earth Sciences, Engineering and Mathematics. Research is coordinated across the college by the College Dean for Research.

b. Research strategy

The school strategy is based on ensuring world-class performance in the four research groupings, evidenced by outputs in major, high-impact journals, strong and diverse research income, collaboration with major international centres of excellence, and increased Impact by embedding possible economic, industrial or engagement impact from the very start of research projects.

Operation of this strategy involves ownership and empowerment at all levels of the school. The overall research strategy cascades down from the School Board, on which all research group leaders sit, through the research committee which involves a broader cross-section of staff to the individual research groups. Each individual member of academic staff is also set research targets, including publication outputs and grant applications and income, in their annual appraisal by the Head of School. The School submits a strategic plan for review within the University every 3 years, in the preparation of which each research group submits their research plan to the research committee and School Board. Since the creation of the 3-college structure in the University these plans will now, in the next iteration, be reviewed at College Board level, chaired by the executive PVC, Head of College, and involving the Heads of Schools, along with the college Deans for Education, Research, and International.

b1: Progress since 2008

Overall the School is in a much stronger position compared to 2008, with a broader base of strength, particularly in experimental physics, but also closer ties between the research groups. Research outputs are stronger and more clearly Cardiff-led, and research income has increased and diversified in source (see table and figures in section d).

There has been intense focus within the School on (a) strengthening individual outputs, particularly in the astronomy areas, by focussing on quality papers clearly led from Cardiff and (b) strengthening the experimental physics area by securing investment from the University to support a number of new appointments, supporting infrastructure and coordinating the new and existing staff into a unified research grouping (CMP). These actions directly support the strategic goals set out in the RAE2008 submission and in the School strategic plans.

A key element of the School's strategy has been strengthening of critical mass and research intensity. **Total REF-eligible academic staff numbers have increased from 25 to 31**. The focus on Cardiff-led outputs has been dealt with both at group level but also in individual staff targets monitored and reviewed in annual appraisal. The nature of large projects, particularly in the STFC-funded areas of research, meant that this was an issue so targets have focused on all staff taking a major or leading role in high-impact papers within large projects, as well as encouragement to publish small-author list papers outside the large collaborations where this is appropriate. The consolidation of the separate instrumentation and astronomy rolling grants into a single grant has also helped this process by ensuring closer collaboration between the instrument builders and data exploiters within the school, particularly on Herschel data.

Strengthening of the experimental physics area and melding into the CMP group has been the largest and most important change in the School in the period. Seven new appointments have been made. Prof David Jesson, a world leader in low-energy electron microscopy, from Monash University, Melbourne. Dr Oliver Williams, a world leader in diamond growth and applications, has arrived from the Fraunhofer institute in Freiburg, Germany. Dr Stephen Lynch arrived from UCL, bringing with him his EPSRC advanced fellowship and has set up his THz Spectroscopy lab. Dr Dan Read, and Dr Sam Ladak, both arrived from Imperial, London, and Dr Sean Giblin from STFC Rutherford Laboratory are all working in the area of magnetic properties of materials, and Dr Phil Buckle, formerly of Qinetic at Malvern has joined and is working on semiconductor devices for quantum information processing. As a result of this increase in total value of **EPSRC grants held has increased from £1.8M in 2008 to £4.8M in 2013**.

Consolidation of existing strength in AIG and Astro groups has also occurred with Tucker being appointed as Lecturer (L) and subsequently Senior Lecturer (SL) within the period, Hargrave was also appointed (L) and subsequently (SL), along with Doyle (to replace Mauskopf, who retains a 20% position). Peretto and Parise have been appointed at (L) and (SL) respectively, following the departure of Ward-Thompson and Whitworth moving to a 50% contract. The star-formation group has been further strengthened by the appointment of theorist Dr Paul Clark, from Heidelberg, from May 2014, filling a post made vacant by the departure of Coles to Sussex University. Papadopoulos has joined on a 5-year STFC Fellowship and works in both observation and theory of star formation in galaxies. Dr Giampaolo Pisano, from Manchester University, has been appointed (SL) in Terahertz Instrumentation and Metamaterials, from March 2014, as succession planning for Prof Ade who will move to 50% research-only contract in Dec 2013.

The Gravitational Physics group has also been strengthened by the arrival of Hannam on a 5-year STFC fellowship with a proleptic lectureship. He has subsequently been promoted to (SL).

b2: Future Plans

Consolidation of existing research strength and grant income in the four groups is the highest priority. This means ensuring all four groups have a strong and diverse income base and are producing a steady stream of high quality outputs which are clearly Cardiff-led. An additional priority is to identify potential impact early in each group's research and **ensure that opportunities for impact are supported and exploited**.

With three of the groups reliant on STFC as the primary funder of their research area **continued diversification of income sources** is essential. European funds are a priority area, especially with the increased funding envelope approved for Horizon 2020. In particular staff are strongly encouraged to focus on ERC grants. Hannam and Williams were both interviewed in September 2013 for possible consolidator awards. We are also actively encouraging Marie-Curie grant applicants externally, as well as the internal eligible candidates such as Peretto, Parise and Clark.

Assuming gravitational waves are detected in the next 3-5 years the GP group are planning to move from searching to exploitation, with consequently expanded research funding and potential synergy with the astronomy group. In preparation Sutton in particular is working on potential "multi-messenger" science where gravitational wave observatories work together with traditional electromagnetic observatories particularly in high-energy photons.

The CMP group priority is to win research funding for all the new appointments as well as renewal of existing research areas by Smowton, Langbein, Elliott and MacDonald. The aim for this group is to then be in a position to apply for and win larger EPSRC programme grants. Increased impact is also a very high priority for CMP.

The AIG are moving towards the rapidly expanding field of exoplanet research with Pascale & Griffin in particular taking a significant role in the planned "EChO" satellite project, which if selected by ESA in early 2014 will be a major programme in the same way that Herschel and Planck have been over the REF period and will create new opportunities for synergy with the astronomy group.

In 2010 the three Welsh Physics Departments made a £10M bid to HEFCW to create a joint Institute for Advanced Study with the aim of establishing the environment for a step-change in investment for physics in Wales. Whilst this vision has yet to come to fruition, cooperation between the Departments has enhanced significantly and plans for further joint initiatives are underway.

Innovation activity, and links with industry are being targeted as a priority area for enhancement, and are being addressed with the appointment in 2012 of a School Director of Innovation and Engagement, as well as an industrial liaison and employability skills officer for undergraduate learning and teaching. Innovation and engagement with industry and other external stakeholders has already increased significantly but will not come fully to fruition until the next REF.

c. People, including:

i. Staffing strategy and staff development

Academic Staff: The School and University actively support staff in developing their careers, particularly early career researchers and new appointees. The school follows well-established University policies on **annual appraisal (with a 100% completion rates in 2011,12 and 13)** and mentoring, with additional measures as follows: (a) a slow ramp-up of teaching for new appointees; (b) taking the Postgraduate Certificate in University Teaching and Learning (PCUTL) course, taken over 2 years, is compulsory for new lecturers; (c) internal peer review of grant applications and papers within research groups, with careful mentoring of early career staff and also more senior staff who have not recently held a grant; (d) sabbatical leave, subject to review and approval by the School Board; (e) encouragement and mentoring for promotion applications: the school has a very strong track record of success in internal promotions on the basis of research excellence, with Davies (R to Prof); Sutton and Elliott (both SL to R), Fairhurst (L to SL to R); Tucker, Pascale, Gomez, Hannam and Hargrave (L to SL) being promoted over the period. Doyle and Cartwright also moved from PDRA to Lecturer with Cartwright now also promoted to SL.

Promotion of staff to positions in other Universities is also a positive sign of our career development processes. In 2012 Ward-Thompson moved from being Deputy Head for Learning and teaching to Head of Astrophysics and Supercomputing at University of Central Lancashire and in 2013 Coles moved to Sussex University to be Head of Mathematical and Physical Sciences.

Flexibility is also critical, so whilst Schutz has a long-standing part-time (10%) position in addition to his Directorship of the Max Planck Institute in Potsdam, Mauskopf has also retained a 20% position here after his move to Arizona State University. We have introduced a flexible scheme for

reducing hours for senior staff: Whitworth has moved to a 50% research-only contract, which allows him to focus on research and frees up funds that allowed the appointment of Parise as a SL to ensure strength and continuity in the area of theory of star formation. Ade moves to a similar contract at the end of 2013 and a new SL appointment (Dr Giampaolo Pisano from Manchester University) has been made, starting from March 2014, as a result.

Cardiff University has a strong leadership development programme which has won a Times Higher award in the outstanding contribution to leadership development category. Several early and mid-career staff within the school have attended this programme for future research leaders, and two ECRs also attended the "Cardiff Futures" personally led by Vice-Chancellor Colin Riordan, which is an opportunity for academic staff to develop their career paths and to explore how they might contribute to shaping the future of the University.

The School is committed to creating a workplace where equality and diversity are respected and appreciated. During the period a new Equality and Diversity committee has been set up, chaired by Dr Annabel Cartwright. A target is to achieve Athena Swan Silver and Juno accreditations by 2015 and current compliance is being reviewed. The aim is to make the school a welcoming environment for all, but without engaging in any kind of discrimination. With the recent appointment of Parise there are now four women out of 35 academics, which although still below the entry level of women into the profession (around 20%), is a massive improvement from no female academic staff in 2005 when Gear first became Head. The recent appointment of Tucker as Deputy Head, Learning and Teaching, will provide an even stronger role model. Cardiff is also one of only 6 Universities to be placed in the Stonewall top-100 employers for LGBT staff.

The school has an excellent track record of international appointments, with 11 academic staff holding non-UK citizenship. All vacancies are advertised internationally as widely as possible.

Other Research Staff: The School follows comprehensive University procedures for probation, appraisal and career development of fixed-term staff, including review and definition of objectives, career goals, and training needs. Participation in undergraduate teaching is a requirement for all PDRAs within the school in order to assist their career development. They receive training and mentoring and take part in either lecturing, lab or exercise class supervision, project supervision and in the case of more experienced PDRAs can be deputy module organisers. PDRAs organise weekly external seminars for all of the research groups. Internal seminars and meetings allow young researchers to gain experience in delivering talks.

The University and School are fully **committed to the Concordat** to support the career development of researchers. A benchmarking exercise was conducted in 2010 and the school has an internal 2-year action plan. Researchers are recognised as full members of the School, and are invited to all school staff meetings as well as being encouraged to engage in teaching, attend corresponding Boards of Study and Exam Boards, as well as their research. There is an annual meeting for all research staff with the Head of School as well as the regular all-staff meetings. The University has been recognised for its commitment to career development of researchers by the award of the European Commission's HR Excellence in Research Award in 2010, renewed 2012.

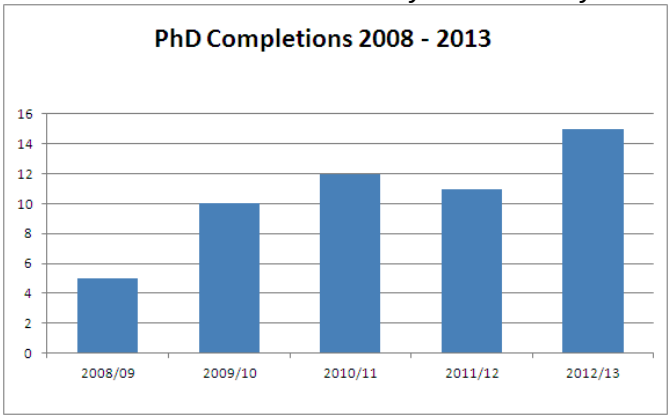
All postdoctoral researchers are encouraged to engage with the extensive career development training courses provided by the University and with the various postdoctoral forums, in particular the Cardiff research programme which is linked to the national Vitae Researcher Development framework (RDF). Mentoring is provided on paper-writing and presentation skills within research groups and also with regard to applications for independent fellowships, to be held either within the School or elsewhere. Open competition fellowships held within the School during the period include: Royal Society URF (Fairhurst); STFC Ernest Rutherford Fellowship (Hannam and Papodopoulos); EPSRC Advanced Fellowship (Lynch); Marie Curie incoming Fellowship (Williams & Jesson); Royal Society Dorothy Hodgkin Fellowship (Cartwright).

ii. Research students

Funded places on both the STFC and EPSRC DTAs have increased over the period. The school is part of the recently awarded EPSRC CDT on Diamond, led by Warwick University. The College of

Physical Sciences and Engineering is also implementing a funding stream to "match-fund" as many RCUK places as possible. Trialled in 2013 this allowed a 50% increase in new RCUK PhD places, from 8 to 12. International recruitment has also increased from 4 in 2008 to 8 in 2013.

Applications are strong, and appointment is by student quality alone, rather than allocation by supervisor, although in the case of new appointments effort is made to match the best applicants to new staff if possible. **Student progress is rigorously monitored** through six-monthly reports by both supervisors and students to the Postgraduate Tutor. Students register first for MPhil and only transfer to PhD after satisfactory end of first year report and viva. If a student fails this hurdle they are put on 3 months probation, subject to review of their supervision, and then have to repeat the process, a second failure results in exclusion unless there is evidence of poor supervision. Six-monthly reports are further required and monitored throughout the student's time. In recent years the school has **improved its PhD 4-year completion rate from 74% in 2008/9 to 91% In 2011/12.** The University have taken our monitoring procedures as an exemplar of best practice to be rolled out across all schools.



The University Graduate School offers support and CPD training courses including preparation for employment as well as general skills such as presenting and time management which are well-used by PhD. Within the School of Physics and Astronomy we also offer specialist training courses including graduate lecture courses. There is an annual Postgraduate Conference at which students give talks on their projects, and an annual postgraduate poster competition. Students are also encouraged to present their results at weekly research group meetings, and to attend at least one international conference during their study at which they are required to either present a poster or give an oral presentation. They are also required to present a summary of the conference upon their return at the weekly research group meetings.

Both STFC and EPSRC have introduced follow-on one-year postdoctoral fellowships for students who have been funded on the doctoral training accounts. The school is the only one in Cardiff University to have an STFC DTA, so there is no competition, but in the first year of the EPSRC scheme three fellowships were available across the University, and, in open competition with students from Chemistry, Engineering, Maths and Computer Science, two of the three fellowships available were awarded to Physics students.

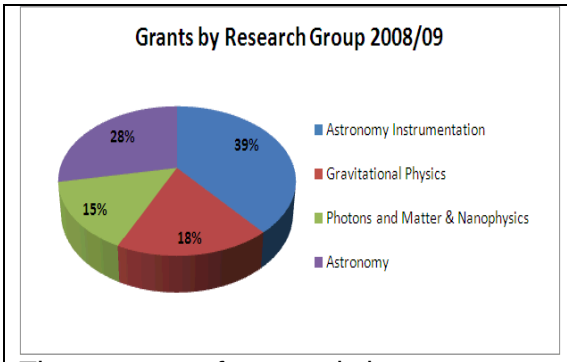
Cardiff University runs an annual research opportunities programme (CUROP) for undergraduates to undertake 8 weeks of research over the summer, which the school has been very successful at exploiting and has been beneficial in giving students experience of research and interacting with academics and research students, leading to several undertaking PhDs, in Cardiff and elsewhere.

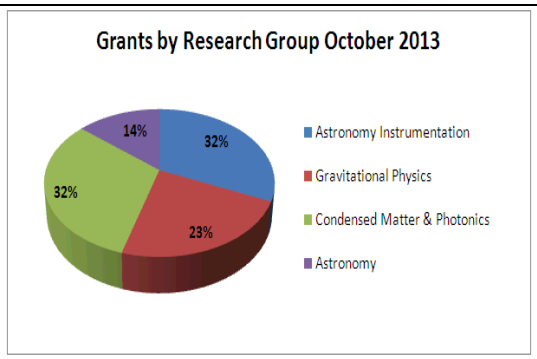
d. Income, infrastructure and facilities

d1: Income

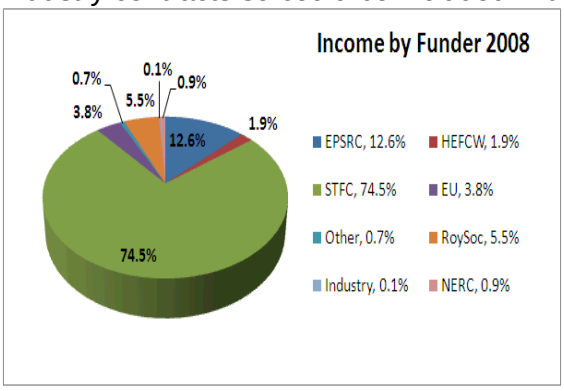
Total grant **awards** over the period amounted to **£23.3M**. Whereas in earlier years grant income in the school was heavily dominated by the AIG there is now a much more equal distributions across all 4 groups, with CMP now comparable to AIG as **EPSRC grants have increased from £1.8M in 2008 to £4.8M at submission.**

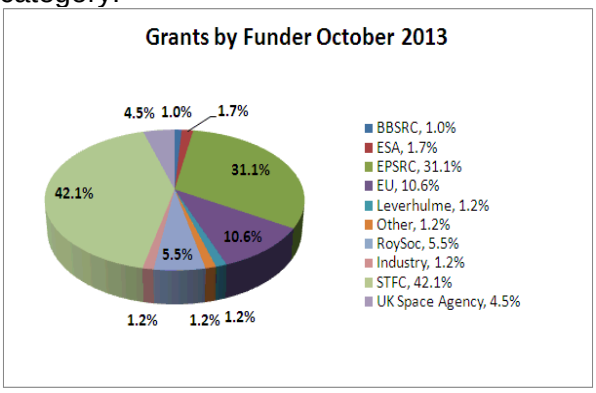
Grants held by Research Group - October 2013	
Astronomy Instrumentation	£4.9M
Gravitational Physics	£3.5M
Condensed Matter and Photonics	£4.9M
Astronomy	£2.1M
TOTAL	**£15.4M**





The sources of research income are now also much more widely spread, with the **75% over-reliance on STFC at the beginning of the period now reduced to below 45%.** European funding is rising and our strategic plan is to increase this further. Industry funding is still small but is on the increase. European space agency (ESA) contracts are regarded and handled effectively like industry contracts so could be included in the same category.





d2: Infrastructure and Facilities

In order to facilitate the creation of the CMP group and support the seven new appointments in this area, substantial investment in facilities and infrastructure have been made. Prof Jesson's state-of the-art low-energy electron microscopy suite was purchased and it and his support team were transferred from Monash University. Prof Jesson has already won a Marie-Curie fellowship grant to support his research in Cardiff. Dr Oliver Williams has arrived from the Fraunhofer institute in Freiburg, Germany and a state-of-the-art laboratory to grow and characterise diamond, including nanodiamond, has been set up, including a diamond reactor, polisher and characterisation equipment. This has been rewarded with several major UK and European grants, including a Marie-Curie Fellowship, and Williams was interviewed in September 2013 for an ERC consolidation grant (outcome unknown at submission). Dr Lynch has set up a THz Spectroscopy lab, including a tunable laser and THz spectrometer. The magnetic materials research of Drs Read, Ladak, and Giblin has been supported with purchase of cryogenic test facilities, as well as a new Raith e-beam set up for the CMP clean-room. In total around **£1.2M has been invested by the University** in this area over the past three years, on top of the salaries of the new posts.

In addition to the special strategic investment just described, the School and University has an enlightened policy of guaranteeing re-investment of a significant fraction of the overheads on grants back within the groups winning those grants. Over the REF period, within the School, **£1.1M has been invested in ongoing support** for research groups in maintaining technical and research staff numbers beyond direct grant support, equipment purchases and maintenance, seedcorn funding for developing new research areas, and travel.

All members of staff in the school are provided with desktop and laptop workstations, and there is a three-person computing support team who maintain computers, software licenses, and data servers with a total storage capacity or around 100Tb. Within the school, staff have access to a computing cluster with 600 cores each with 2Gb memory. In addition all staff have access to the Advanced Research Computing facility (ARCCA) at Cardiff University, which provides HPC capacity with a "Raven" cluster of 2048 Intel Xeon 2.6 GHz cores each with 4Gb memory per core, as well as smaller, higher throughput clusters. This is one of the largest and most efficient

academic supercomputer facilities in the UK.

The large computing facilities are mainly utilised by the GP and Astro research groups; there is also excellent infrastructure for the two large experimental groups. The AIG occupy 1400 m^2 of lab space, with cryogenic facilities to conduct experiments down to 20 mK, including 2 dilution fridges, ADRs and numerous He-3 systems. Test facilities including a state-of-the-art FTS spectroscopy lab, VNAs and a microwave anechoic chamber, along with a dedicated clean-room for meta-material and optical component production as well as access to the CMP clean-room for specialist deposition processes for the superconducting detector programme. The CMP clean-room consists of 300m^2 of mixed class 100/class1000 space containing the equipment necessary to produce bespoke optoelectronic/electronic/spintronic and magnetic devices and test structures including Raith e-line electron beam lithography, Inductively Coupled Plasma and Reactive Ion etching for feature sizes down to 10s of nm. The CMP group also occupy 800 m^2 of lab space, including Class 4 laser areas, optical and electronic device testing facilities from dc to high frequency and from cryogenic to high temperatures, nano-crystalline diamond growth and materials assessment, advanced LEEM, AFM and STM including biocompatible systems.

There are two mechanical workshops in the School, with two engineer/technicians in each, one mainly focused on teaching support and the other on research but with shared effort and management. In addition there is an electronics workshop with (one full-time and one 60%) engineers to support research and teaching, and there is full-time safety officer who is an expert in Chemistry to support researchers.

The RCUK-funded facility “income-in-kind” amounts to some £15M over the period. This includes HERSCHEL satellite time, for which **Cardiff PIs won more time than any other institution in the world.** Examples of non-RCUK facility usage include: (a) Davies is PI of the AGES project which has been awarded 2000 hours on the Arecibo telescope (largest single dish in the world). (b) Read has been awarded an average of 5-10 days beam-time per year on the University of California Advanced light source. (c) Lynch has been awarded beam time on the FELIX light source in the Netherlands over the period. (d) Macdonald and Williams have won Diamond beam time. (e) Hannam has won 54M cpu hours on the European PRACE clusters, estimated value £1.7M.

e. Collaboration or contribution to the discipline or research base

All research groups are involved in extensive collaboration effort at national and international levels and have staff with strong profiles in their field. We emphasise here only exemplars by group.

International collaborations: Membership and leadership of major international collaborations are a strong indicator of world-class performance and the school strongly encourages its staff to enter such collaborations where appropriate, including providing generous travel funds, and permission to travel away, including during term time as long as student experience is not affected.
AIG: Griffin’s role as PI of the SPIRE instrument consortium (18 institutes in 8 countries) for the Herschel satellite; Gear’s joint leadership (with Sarah Church of Stanford University) of the QUAD CMB polarization experiment. Ade’s leadership of the UK technical team for construction and operation of the HFI instrument on the Planck satellite. Members of the group also play a Co-I role in more or less every mm/submm experiment in the world, far too numerous to list, but an exemplar being the BLAST balloon project for which 7 out of the 24 papers were Cardiff-led.
GP: The group is in a very strong position within the LIGO science collaboration (LSC). Fairhurst and Sutton both chair Science Working Groups. Sathyaprakash took a leading role in writing the science case for the European proposal for the Einstein telescope, and for the ($200M) Indian gravitational wave observatory which will join the Advanced LIGO project.
A: Eales’ leadership of H-ATLAS, the second-largest (600h) open time survey with Herschel, and Davies’ leadership of HEVICS (293h) and Fornax surveys with Herschel. Davies’ leadership of the AGES HI survey of Virgo on the Arecibo dish, 2000h awarded.
CMP: Williams has strong links with Bergonzo at CEA, Saclay, and Haenen in Hasselt, Belgium on diamond growth as well as Cheng at National University of Taiwan. Smowton has a strong international profile and collaborates with Stanford, and Wisconsin in the US, Chalmers and EPFL, Switzerland and the Max Planck and Ferdinand Braun institute in Berlin, within Europe.

International visitors: The school provides facilities for a regular stream of visitors for both research collaboration and also as seminar or colloquium speakers. Some high-profile recent examples are Prof Richard Ellis from Caltech, Prof Alan Marscher from Boston University, Bob Johnson from Seki Diamond, Santa Barbara, Prof John Ellis from Kings, London, and Prof Thomas Baumgarte from Bowdoin College, USA.

Interdisciplinary Research: Some areas of the School's research portfolio are by their nature more likely to lead to interdisciplinary activity than others. Highlights by group are as follows:
CMP: Langbein collaborates very strongly with Prof Paola Borri in Cardiff Biosciences on development of optical microscopy techniques, specifically non-linear vibrational microscopy. Willliams, MacDonald and Elliott all work closely with Chemistry both in Cardiff and elsewhere. The magnetic materials research of Giblin, Ladak and Read is closely related to and share facilities with the Wolfson Centre for Magnetics research facility in the School of Engineering.
AIG: Tucker has long-standing EPSRC-funded collaborations with Cardiff School of Optometry on THz spectroscopy of developing cornea and also on macular degeneration. Ade and Hargrave are involved in Earth Observing satellites, & are part of the TSB sensors and instrumentation KTN.
GP: There has been a long-standing collaboration with computer science on signal processing and development of the Triana software environment.

Collaboration with Industry: (further details are given in the impact template)
AIG: The QMCI spinout (see Impact case study 2) is very closely associated with the group, and shares lab space and equipment as well as relying heavily on IP developed by group members. Under development, by Doyle and others is the KIDcam THz camera for industrial inspection and security checking purposes at e.g. airports. Ade is also working very closely with SME Chase Cryogenics in developing a compact, low cost mini-dilution refrigerator for cryogen-free sub-Kelvin provision. Hargrave works with SEA Ltd on design studies for future Earth Observing satellites.
CMP: Williams collaborates with ElementSix, world leaders in diamond technology for industrial uses, and also with Swiss Diamonds on single crystal gem diamond growth. Langbein (with Borri in Biosciences) works with BBI solutions on nonlinear plasmonic biosensing and functional imaging, including winning a joint EPSRC grant award. Smowton has ongoing collaboration with both Oclaro and IQE as part of an EPSRC KTN on light sources in silicon and also with Samsung Advanced Institute of Technology (SAIT) on quantum dots as laser sources. Jesson has a strong collaboration with IBM at Yorktown, New York, on control of the fabrication and self assembly of new semiconductor nanostructures.

Community Leadership:
AIG: Griffin is chair of STFC Science Board, and was previously vice-chair, he also sat on the EU FP7 Space Advisory Group and a COSPAR international working on group on space astronomy. Gear chaired STFC Particle Physics, Astronomy and Nuclear Physics committee (2007-09) and is currently Chair of the James Clerk Maxwell Telescope (JCMT) international oversight Board, of which Griffin was also previously chair. Tucker sits on the STFC Industrial Partnerships Scheme panel. Mauskopf chaired the STFC Particle Astrophysics Advisory Panel (PAAP).
A: H.Gomez is a member of the STFC "Education , Training and Careers", as well as "Women in SET" Committees, also a member 2010-2012, and 2013/14 of its Rutherford Fellowship awards committee, and JCMT time allocation committee (2011-). Whitworth is a member of the STFC astronomy theory grants panel, as was Coles whilst in Cardiff.
CMP: Smowton has been on a large number of EPSRC grant panels at all levels and Lynch has chaired a responsive mode panel. Williams has sat on grant panels for the Belgian funding agency, FWO. Smowton is an elected member of the board of Governors of the IEEE Photonics Society (2012-14); also a member of the EPSRC National Centre for III-V Technologies steering committee. Read is a committee member of the UK magnetic society.
GP: Group members have a very high profile in the world-wide LIGO scientific collaboration (LSC): Sutton is co-chair of the burst working group and elected member of the LSC council. Fairhurst is chair of the Compact Binary coalescence group and member of the executive board. Sutton is also a member of the European AstroParticle Physics Consortium (APPEC) science advisory committee and of the STFC PAAP.