

# Quality Assurance / Quality Improvement Programme



## School of Physical Sciences

### Peer Review Group Report

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## Introduction

This Quality review has been conducted in accordance with a framework model developed and agreed through the Irish Universities Association Quality Committee and complies with the provisions of Section 35 of the Universities Act (1997) and the 2012 Qualifications and Quality Assurance Act. The model consists of a number of basic steps.

1. An internal team in the School/Faculty/Office/Centre being reviewed completes a detailed self-assessment report (SAR). It should be noted that this document is confidential to the School/Faculty/Office/Centre as well as the Review Panel and senior officers of the University.
2. This report is sent to a team of peer assessors, the Peer Review Group (PRG) – composed of members from outside DCU and from other areas of DCU – who then visit DCU and conduct discussions with a range of relevant staff, students and other stakeholders.
3. The PRG then writes its own report. The School/Faculty/Office/Centre is given the chance to correct possible factual errors before the PRG report is finalised.
4. The School/Faculty/Office/Centre produces a draft Quality Improvement Plan (QulP) in response to the various issues and findings of the SAR and PRG reports.
5. The PRG report and the draft QulP are considered by the Quality Promotion Committee (QPC) and University Executive.
6. The draft QulP is discussed in a meeting between the School/Faculty/Office/Centre, members of the PRG, the Director of Quality Promotion and members of Senior Management. The University's responses are written into the draft document and the result is the finalised QulP.
7. The PRG Report and the QulP including the University's response is sent to the Governing Authority of the University, who approves publication in a manner that it sees fit.

This document is the report referred to in Step 3 above.

## Peer Review Group Report for School of Physical Sciences

### 1. Introduction and Overview

#### Location

The School of Physical Sciences' administrative and academic offices and laboratories are located in the Marconi (N) building in DCU where the School's space envelope is approximately 2,400m<sup>2</sup>. The Faculty administration team which provides support for the School administration occupies a shared space on the ground floor of the Nursing and Human Sciences (H) Building. The Faculty Manager, Assistant Faculty Manager and PA to the Dean are located in adjacent offices on the third floor of this building.

The first meeting between the Peer Review Group (PRG) and the School of Physical Sciences Self-Assessment Report (SAR) coordinating committee was an introductory meeting which took place in room CG35. Follow-on meetings were conducted between the PRG and the School's academic, technical staff and with internal and external stakeholders of the School. The Peer Review Group (PRG) also visited the labs that the staff and students in School of Physical Sciences use where the PRG were given a tour and demonstrations by post-doctoral researchers, PhD students and technical support staff. A meeting with the senior management of the University was held on day three of the visit to advise on and discuss the preliminary findings of the PRG.

#### Staff

The School of Physical Sciences currently consists of 27 members of staff: 16 academic staff (4 professors, 2 associate professors, 4 senior lecturers, 3 full-time lecturers, 3 contract lecturers (2 full-time and 1 term-time)), 1 adjunct staff member, 2 emeritus professors, 6 technical staff (5 full-time and 1 semesterised contract) and 1 administrator.

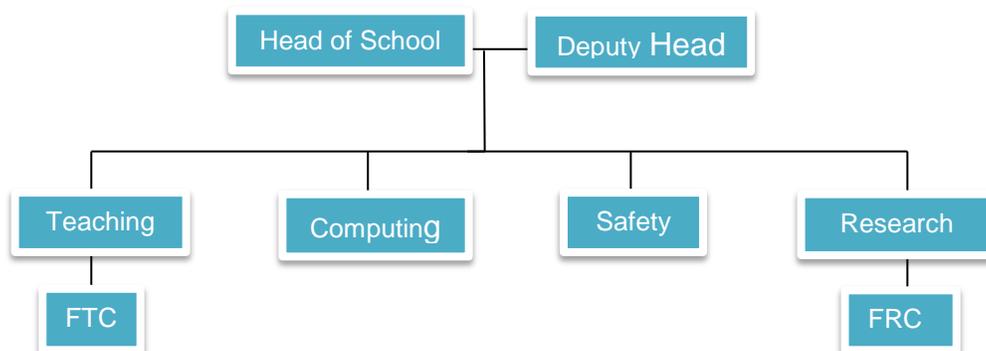
#### Functions / Activities

The management of the University is based on a Faculty structure with four Faculties and a number of academic Schools associated with each Faculty. The School of Physical Sciences is part of the Faculty of Science and Health (FSH). The main business of Teaching & Learning and Research in the Faculty is conducted through three committees, the Faculty Teaching Committee (FTC), Faculty Research Committee (FRC) and the Faculty Management Board (FMB). The Schools and Research Centres have representation on these committees.

The management of the School of Physical Sciences is illustrated in Figure 1. The Deputy Head is an unofficial position who advises the Head and assists with decision making. The principal Executive committees are the School Teaching and Research committees. The Teaching Committee comprises the three Programme Board Chairs/Teaching Convenor and all staff teaching into the Physics programmes. The interaction with the FSH is mainly through the twice yearly Teaching Planning Meetings. The Research Convenor chairs the School Research committee. The membership includes all academic staff and either all the membership or a subset meets, as required, to discuss research matters.

Plenary School meetings (comprising technical, admin, IT and academic staff) are held about 4 times per year with academic only meetings taking place on an *ad-hoc* basis throughout the year to deal with programme structure planning and other issues. The Research Convenor sits

on the Faculty Research Committee (FRC) which meets every 2 months, as well as on Academic Council. The Teaching Convenor sits on the Faculty Teaching Committee (FTC) which also meets every 2 months. The Head of School sits on Faculty Management Board and Academic Council. Members of the School management team sit on many other university level committees as elected or nominated members. The School also has a Safety Committee and a Computing Committee and Safety and IT/Computing are agenda items for all School Meetings.



**Figure 1 Management Structure of School**

**The current Head of School is** Prof. Colette McDonagh (2012-2015) and the post is on a 3-year rotating basis

The B.Sc. in Applied Physics, the B.Sc. in Physics with Astronomy and the B.Sc. in Physics with Biomedical Sciences are the core undergraduate degrees developed, run and managed by the School of Physical Sciences. The B.Sc. in Science Education is jointly delivered by the Schools of Physical Sciences, Chemical Sciences and Mathematical Sciences with important support from the School of Education Studies. The rotating Chair of the programme always comes from one of the Faculty of Science and Health Schools. The School also contributes to the B.Sc. in Environmental Science and Health, a programme managed by the Schools of Chemical Sciences and Biotechnology.

Research in the School of Physical Sciences at DCU encompasses diverse topics from Nanoscience and Microfluidics through Astronomy to Physics Education. Research areas include experimental and theoretical studies of intense laser-matter interactions, experimental, applied and computational plasma physics, semiconductors and nanomaterials, optical sensors and biosensors, surface and interface physics, microsystems (with emphasis on microfluidic lab-on-a-chip technologies), physics education and astronomy/astrophysics.

Much of the work is carried out in collaboration with EU partners and partners in Irish universities and is supported by a variety of National and EU programmes including Science Foundation Ireland (SFI), Enterprise Ireland (EI) and the EU Horizons 2020 programme. School academics play a significant role in major research centres based in DCU in particular the National Centre of Sensors Research (NCSR ([www.ncsr.ie](http://www.ncsr.ie))), the National Centre for Plasma Science and Technology (NCPST ([www.ncpst.ie](http://www.ncpst.ie))), the Biomedical Diagnostics Institute (BDI ([www.bdi.ie](http://www.bdi.ie))) and the CASTeL (Centre for the Advancement of Science and Maths Teaching and Learning) Centre [www.castel.ie](http://www.castel.ie). Researchers in the School have successfully competed for approximately €10 million euro in research funding over the last five years.

## **2. The Self-Assessment Process**

### Co-ordinating Committee

Prof. Colette McDonagh, Head of School and Chair of School Quality Committee  
Dr. Eamonn Cunningham, Teaching Convenor  
Dr. Lampros Nikolopoulos, Research Convenor  
Ms. Lisa Peyton, School Secretary  
Mr. Alan Hughes, Chief technician  
Dr. Justin Bogan, Postdoctoral Researcher  
Mr. Ben Delaney, Postgraduate student

### Committee Methodology

The School Quality Committee was established in December 2013 charged with the central responsibility of planning and implementation of the review and developing the SAR. The committee designed and circulated a number of surveys in March/April 2014 to obtain feedback from stakeholders as follows:

- (i) School staff including researchers
- (ii) School postgraduate students
- (iii) School physics majors from the three physics programmes.
- (iv) All staff in DCU
- (v) Internal survey in relation to service from University units.
- (vi) Survey of selected staff in other Schools in the Faculties of Science and Health and in Engineering and Computing in relation to modules delivered by SPS to their students.

Analysis was carried out over subsequent months and discussed at a number of Staff Meetings and at a School Away Day on September 18<sup>th</sup> 2014. Focus groups were also convened for undergraduates, postgraduates and external stakeholders. The completed SAR was developed over a period of six months, starting in June 2014. The document was written mainly by Eamonn Cunningham (EC), Lampros Nikolopoulos (LN) and Colette McDonagh (CMD) who met every 2 weeks on average from June 2014 to final submission of the document.

Colleagues in the School were consulted regularly during the process and any requested information was communicated to CMD in a timely manner. The Quality Review was included on the agenda of School meetings where regular updates were provided for staff.

The Away Day held in September 2014 focussed on the development of a SWOC analysis. The event was facilitated by Mr. Martin Leavy, from the Training and Development section of Human Resources, DCU and was attended by about 85% of staff (academic, technical, admin and IT) and by a representative of the postgraduate student body and of the postdoctoral research staff.

### 3. The Peer Review Group Process

#### Peer Review Group

Prof. Ronan McGrath  
Head, School of Physical Sciences, The University of Liverpool

Professor Andy Shearer  
Head, School of Physics, NUI Galway

Dr Sheila Gilheany  
Policy Advisor, Institute of Physics in Ireland

Dr Caitriona Lally  
School of Mechanical and Manufacturing Engineering, Dublin City University

Dr Stephen Daniels  
School of Electronic Engineering, Dublin City University

#### Self-Assessment Report

The Self-Assessment Report (SAR) provided was a comprehensive document, containing detailed information about the School of Physical Sciences and the School's wider environment. Appropriate appendices were provided and the PRG had access to all relevant information about the Faculty and the wider university setting. The SAR outlined the findings of the previous quality review carried out in 2002 and how the recommendations outlined at that time were addressed.

The PRG was satisfied that all staff members, undergraduate and postgraduate students and other individuals who have regular interactions with the School, were given the opportunity to voice their opinions and inform the SAR document.

It was felt, perhaps in keeping to the template provided, that the SAR focussed more on outlining the structure and function of the School rather than highlighting the significant contribution that the School makes to the strategic objectives of the University.

#### Review Visit Programme

Day	Time	Peer Review Group (PRG) Activity/Meeting	Venue	Meeting No.
<b>Day 1 Wed Dec 3<sup>rd</sup></b>	12.30-13.30	Lunch with Director of Quality Promotion and PRG members	1838 DCU	
	13.30-14.30	Briefing by Director of Quality Promotion; Guidelines provided to assist PRG during the visit and in developing its report.	CG35	
	14.30-15.30	PRG selects Chair. Discussion of main areas of interest and/or concern arising from the Self Assessment Report (SAR).	CG35	
	15.30-16.30	Colette McDonagh and School of Physical Sciences Quality Review Committee; Eamonn Cunningham, Lampros Nikolopoulos, Lisa Peyton, Alan Hughes, Ben Delaney (postgrad), Justin Bogan (Postdoc) <i>(Director of Quality Promotion in attendance)</i>	CG35	
	16:30-16.55	PRG Private meeting	CG35	

	17.00-17.55	Informal Reception – PRG, Head of School, Members of School Quality Review Committee, Director of Quality Promotion	1838 DCU	
	18.00-18.20	PRG private meeting	1838	
	18.30-20.00	PRG private dinner	1838 DCU	
<b>Day 2 Thurs Dec 4<sup>th</sup></b>	08.45-09.00	PRG Private meeting Stokes Building, DCU	S208	<b>Meeting No.</b>
	09.00-09.25	Prof. Colette McDonagh, Head of School of Physical Sciences	S208	1
	09.30-09.55	Deputy Head, Teaching Convenor, Research Convenor, Programme Board Chairs, School of Physical Sciences	S208	2
	10.00-10.25	School Academic Staff :	S208	3A
	10.30-11.00	<i>Coffee</i>	S208	
	11.00-11.25	School Academic Staff:	S208	3B
	11.30-11.55	School Technical, IT and Admin staff :	S208	3C
	12.00-12.25	Heads or Senior staff in DCU Support / Service Offices	S208	4
	12.30-12.55	Administrative Staff representatives from Schools, Faculties or Research Centres from varying levels within central administration	S208	5
	13.00-14:00	<i>Lunch</i>	S208	
	14.00-14.25	Tour of Facilities – Prof. Colette McDonagh	S208	
	14.30-15.25	Representatives from varying levels of academic staff working with School, including Programme Chairs.	S208	6
	15.30-16.25	Representatives of students from various academic programmes.	S208	7
	16:30-16:50	<i>Coffee</i>	S208	
	16.50-17.15	Open forum for any member of School staff	S208	
	17.15-17.55	Meetings with external stakeholders (alumni, employers, suppliers, Colleges of DCU, members of Governing Authority depending on relevance to School), employers, alumni.	S208	8
	18.05-18.15	PRG private meeting time	S208	
	19.30	PRG private dinner	Crowne Plaza Hotel	
<b>Day 3 Fri Dec 5<sup>th</sup></b>	08.45-09.00	PRG Private meeting	AG01	<b>Meeting No.</b>
	09.00-09.55	DCU Senior Management Group (SMG) <i>(Director of Quality Promotion in attendance)</i>	AG01	9
	10.00-10.25	Area Reporting Head (usually member of SMG)	AG01	10
	10.30-11.00	Meeting with Ger McEvoy, Estates; Gareth Yore, HR; Justin Doyle, ISS,	AG01	
	11.00-12.45	PRG private meeting time. <i>Coffee</i>	S208	
	12.45-13:45	<i>Working Lunch</i>	S208	
	13:45-14:00	Prof. Colette McDonagh, Head of School of Physical Sciences	S208	
	14.00-16.00	PRG Prepare Exit Presentation	S208	
	16.00-16.30	Exit Presentation – by PRG to all School staff <i>(Director of Quality Promotion in attendance)</i>	S206	11

## Methodology of the Review Visit

To manage the process effectively, the PRG agreed upon a Chair for the group, Prof. Ronan McGrath, and assigned specific areas of responsibility to each member of the group.

Overall, the PRG was very impressed with the professional manner in which the visit was coordinated. Throughout the whole process staff, students and external stakeholders alike were open and forthcoming and engaged positively with the process. The format of the site visit programme enabled the PRG to meet with most of the academic staff of the School, a high proportion of the support staff and a representative group of other users/stakeholders including undergraduate and postgraduate students, postdoctoral researchers, employers, staff from other Schools and staff in key support roles within the university. In addition, the opportunity to meet key members of the University senior management was much appreciated.

Whilst the process was coordinated effectively and clearly, the PRG would have found it beneficial to have had more dedicated time scheduled in the timetable to speak to School academic staff, perhaps under specific themes such as teaching, research and management.

### **4. Findings of the Peer Review Group**

#### 4.1 Background, overview, strategy, context

The panel established that DCU has an excellent global reputation, evidenced by its strong showing in internationally recognized league table positions. For example DCU comes 44th in the QS 2013 50 universities under 50 years old table alongside for example City University of Hong Kong, Bath and Loughborough. It also comes 366th in overall QS 2013 rankings (c.f. Essex 370, Herriot-Watt 352).

The University has an ambitious and coherent Strategy document " *Transforming lives and societies 2012-2017*" which enunciates four core principles (Transformation, Enterprise, Translation and Engagement and 2 foundational principles (Academic Excellence, Operational Excellence).

Accordingly, the PRG took the approach of reviewing the quality of the School of Physical Sciences contribution to delivering the University strategic objectives in each of the above areas.

Although small, and facing significant resource challenges, the panel considered that the School makes substantial contributions to all of the university's strategic goals. It should be emphasised that much of this was not identified in the SAR but emerged in discussions during the course of the review visit.

In terms of Academic Excellence, the School performs exceptionally well in research activity. More details are given in section 4.4a below, but in summary using fairly rudimentary benchmarking against key metrics, the School performs at a level comparable to similar sized members of the Russell group of research intensive UK universities<sup>1</sup>, membership of which is used by its members as an indication of international excellence and quality.

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<sup>1</sup> The Russell Group is a group of "24 leading UK universities committed to maintaining the very best research, an outstanding teaching and learning experience and unrivalled links with business and the public sector", see <http://www.russellgroup.ac.uk/>.

In regard to **Enterprise**, there was evidence of substantial activity, for example as measured by the Faculty's Enterprise Engagement list for 2013. This indicates significant involvement in a range of start-up companies and indeed there was anecdotal evidence of enterprise among the student undergraduate population. It was not evident that enterprise development was being fostered as part of the undergraduate curriculum, and this will be returned to in section 4.4c.

In relation to **Translation**, there were particular strengths in microfluidics, plasmas, and materials, though sometimes the School of Physical Sciences' contribution was obscured, being delivered under the umbrella of the research centres.

Developing relationships at School level with other higher education (HE) organisations such as Maynooth University, Dublin Institute of Advanced Studies (DIAS), Dunsink Observatory, industrial companies such as Intel, and SMEs such as Ocean Optics Ireland indicate a strong contribution to Engagement. In the case of the HE sector, this also helps implement the 3U<sup>2</sup> agreement brokered at University level.

With respect to **Transformation**, the PRG also saw some really outstanding contributions, e.g. The Science Education programme, the use of the biomedical microfluidics lab in undergraduate training and the activities of the CASTeL centre.

Overall it is fair to say that the School is delivering well in terms of contribution to the University strategic goals. In the SAR and during meetings with staff the PRG found a tendency to undersell this contribution. The PRG therefore recommends that the School develop a holistic strategy document which clearly demonstrates its strategic contribution as well as containing plans for how this contribution is to be maintained and enhanced in the future.

#### 4.2 Organisation and management

Leadership is provided by the Head of School (HoS) supported by senior colleagues and the School has a committee structure that appears sensible and appropriate for its size and shape.

The PRG found much anecdotal evidence that the School is collegiate, with a shared understanding of the difficulties of operating within a very restricted resource environment. The academic workload is allocated by the HoS using a set of agreed principles. However, it was less transparent in practice whether the allocation was equitable and there was no common understanding of what was a typical or average teaching load (the PRG heard variations from 2 to 6 modules). Therefore it is recommended, in line with best practice in the sector, that the workload model become more detailed and transparent. This is consistent with the University intentions (evidenced in the response of the University to recommendation 12 of the PRG report on the Faculty of Science and Health 2012) and also addresses the equality and diversity agenda in a tangible way as the School prepares for its Athena SWAN bronze application.

As mentioned in the previous section, the School makes excellent contributions to the University's strategic objectives, but does not publicise these effectively enough both internally

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<sup>2</sup> A new partnership in Irish higher education that combines complementary strengths of Dublin City University, Maynooth University and the Royal College of Surgeons in Ireland, working together on shared initiatives to deliver world-class education and research opportunities.

and externally. This leads to a lack of influence in the university's strategic planning. In conjunction with developing its strategy document, the School should devise an appropriate communications strategy to better publicise the School's contribution internally and externally. This could be a blend of a number of methodologies including one-to-one briefings, web presence, newsletter, social media and other activities.

During the course of the PRG review visit, discussions were held with the HoS and with the University senior management group (SMG) concerning the support available to those in leadership roles and also in leadership development and succession planning. These issues are of great importance to the School and wider University and while there are some elements of a development and support structure in place there is opportunity to do more in the areas of leadership and succession planning, mentoring, and networking for Heads of School and those in other leadership roles.

In terms of overall staff development in the School, the PRG recommend that the University should reintroduce the Performance Management Development Scheme (PMDS). The opportunity for a structured conversation encompassing all aspects of role, and contribution to the organisation, is beneficial at all career stages and is embedded in the culture of most large organisations.

Another factor which hinders the ability of the School to deliver the highest quality Student Experience is the limitations of the current timetabling system. The implementation of timetabling at Faculty level creates difficulties for students to access what would be very appropriate modules delivered by other Schools and faculties. This was especially the case in the *Physics with Biomedical Sciences* programme, where some important modules had been withdrawn because of timetable clashes. The SMG acknowledged that with the upcoming DCU Incorporation Programme<sup>3</sup>, centralised timetabling would be a necessity because of the complexities of operation across several campuses. In addition to facilitation of cross faculty teaching, there would be student benefits (personalised timetables available electronically), and resource gains (more efficient use of teaching space).

Finally, there were indications in the School meetings of a lack of understanding of the budgetary constraints under which SMG is operating, and a lack of awareness of opportunities for accessing funds for special purposes which are not available through the normal planning and budgeting cycle, including for example maintenance, cover for statutory leave and strategic staffing. The University and Faculty should increase efforts to make budgeting more transparent in order to communicate effectively to Schools how their contributions in research and teaching affects income generation and budget allocation.

#### 4.3 Staffing and accommodation

From the SAR, it is clear that School has suffered in recent years under the government's Employment Control Framework (ECF), in particular with regards to academic staffing. Whilst there are 27 staff members in the School, there are 14.8 FTE academic staff with several of

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<sup>3</sup> The DCU Incorporation Programme is the planned coming together of St Patrick's College, Drumcondra, Mater Dei Institute of Education and Church of Ireland College of Education with Dublin City University. The vision of the DCU Incorporation Programme includes a new Institute of Education and an enhanced Faculty of Humanities & Social Sciences that will incorporate the combined strengths of the four institutions.

these staff members on contracts. The resulting student / staff ratio has risen from 12.2 in 2010/2011 to 15 in 2014/2015. This is high based on the Russell group median staff/student ratio of 10:1 for Physics, which is the recognised norm for a research intensive university in the UK.

While the staff are generally excellent, they are over-stretched and some appointments will be needed in the coming years to maintain the vibrancy of the School. While the budgetary constraints on the University are recognised by the PRG, it is likely that some strategic appointments will be made in the medium term in the University. The School should ensure that it has identified its key growth areas such that this information is foremost in the mind of the Dean and in turn the University Senior Management.

Technical and Administrative staff play a vital role in the activities of the School and are critical to its future development. It was clear to the PRG that there are an number of highly skilled, high performing staff in this category that have limited career progression opportunities under the current structures. This is a University-wide issue that University senior management should consider. However, in the short term, mechanisms for the formal recognition of exceptional performance would be helpful in sustaining morale and motivation.

The staff uniformly had concerns relating to the upkeep of facilities in particular (but not exclusively) relating to undergraduate laboratories. The PRG noted that activities that relate to the upkeep of the physical assets of the University are being carried out / financed at School level rather than through the University facilities function. This is a University-wide issue that needs to be considered by senior management, and the PRG recommend that the budget available to the estates office for general maintenance / small works is reviewed by the University to assess whether or not it is fit for purpose.

#### 4.4 Functions, activities and processes

##### 4.4a Research

Physics research in DCU is in a very healthy state with a broad range of interests and collaborations. From the SAR it is clear the School is, on average, performing well by international standards. There is good participation in a number of University interdisciplinary research centres including CASTeL, Biomedical Diagnostics Institute, National Centre for Sensors Research, National Centre for Plasma Science and Technology. These provide excellent resources and enable significant project funding possibilities. The PRG found that generally there was a harmonious relationship between the School and the Research Centres.

From the provided metrics the publication rate is about 4.5/FTE academic/year, including papers in very high impact journals such as Nature Physics, Physical Review Letters and Applied Physics Letters. The average grant income is €140,000/academic/ year. PhD supervision is currently 2/academic dropping from an average of 3/academic. These are figures similar to the UK's Russell group of universities. The distribution of activity across the Schools is however somewhat hidden in this data given that there are clearly a few research stars within the School that skew the statistics. Furthermore, a number of academics are not eligible for funding under the National Research Priority Exercise and this impacts upon the overall metrics of the School.

Although the School has an impressive research portfolio, the way the portfolio is presented weakens its potential impact within the University and to outside bodies. This potentially reduces the School's ability to attract future research funds and to halt the decline in PhD students. The School would benefit considerably by firstly presenting its research portfolio more cohesively and secondly, by examining ways it could improve some of its underlying metrics.

The School currently has eight research groups, five of which have one or two academics in them. The PRG propose the reorganisation of these groups into clusters so the School can present a number of research themes to the DCU community and the outside world. Suggested clusters include the following but others may be developed by the School:-

- **Plasma Physics cluster:** Atomic and Laser Plasma Research Group; Plasma Research Laboratory; Astrophysics group and Plasma Diagnostics and Modeling.
- **CASTeL**
- **Materials Growth and Characterisation**
- **Biophysics** : Microfluidics Platforms group; Optical Sensors Laboratory

The clusters as indicated above effectively define thematic research areas and also have the advantage of not impacting on School links such as those with NCPST. Existing research groups could also still exist under these umbrella descriptions. Using these or similar clusters it would be easier to align the School's research strategy to those of the Faculty and University.

PhD recruitment must be a key activity over the next few years. The PRG suggest the following actionable measures to address this:-

- Develop a common strategy for IRC recruitment building upon the research clusters. Make it easier to write IRC and other proposals with common descriptors available at a School/Faculty level. Make available successful IRC proposal documents.
- Leverage existing industrial linkages for say IRC Employment based PhD studentships. Use the INTRA programme (or the proposed advisory panels) to develop these links so a student could go from an INTRA placement, to a final year project and then on to an Employment based IRC.
- Examine School/Faculty funding of PhD studentships to help with part-time teaching, e.g. funded Graduate Teaching Assistant Studentships.
- Encourage and support participation and leadership in (e.g.) EU COST and ITN schemes.

Through these and other means it should be possible to move towards a more even distribution of research activity that generates resources even for areas not currently fundable.

Finally, the PRG found that PhD students were largely unaware of the operation of the new structured PhD programme. This should be communicated to each new PhD cohort.

#### 4.4b Translation and enterprise

The PRG found the levels of engagement with enterprise and other external stakeholders by the School staff to be impressive and another example of the major contribution the School makes

to the University strategy. The School is engaged, relevant to industry and the wider community, and eager to collaborate.

The PRG met a number of employers and research partners who provided very positive feedback. The opinion of several School staff members was that this activity could be further developed in order to, for example, build future research links with enterprise. The PRG found, however, that the School has the opportunity to improve its communication /marketing of its research to a broader technical audience. Whilst the PRG recognised that there are a number of worthwhile initiatives already started in this area, the School is encouraged to avail of the marketing experience in the Research and Enterprise hubs to help develop marketing material of research strengths.

#### 4.4c Teaching and learning

This quality review took place against the backdrop of the difficult external environment in which the University is currently operating. Overall budget reductions and restrictions on staff recruitment via the Employment Control Framework (ECF) have resulted in permanent staff being replaced by contract staff and an absence of appointments in specialised areas. In spite of this difficult environment, the PRG were very impressed with the enthusiasm and clear dedication of the staff in the School.

The PRG were aware that providing a student-centric education is at the core of the University strategic plan, and with this in mind the PRG looked at the current degree offerings of the School. The PRG particularly noted the excellent work in teaching innovation and pedagogy through CASTeL and felt this was a unique selling point which should be exploited further in marketing the physics programmes.

Whilst the PRG heard how market research informs the development of new programmes, the PRG suggest that ongoing evaluation is conducted to review the success of such programmes. This is particularly relevant to the MSc in Plasma and Vacuum Technology which has low numbers enrolled/graduated in the last few years. The two specialised programme offerings at BSc level, Physics with Astronomy and Physics with Biomedical Science, also need to be reviewed in this context and against the backdrop of the ECF, whereby staff have not been recruited to support the specialised aspects of these programmes. The student experience in these programmes should be improved by further developing the links with other Schools and relevant external agencies or institutions, e.g. School of Mathematical Sciences, DIAS, Maynooth University and Dunsink observatory in the case of the BSc in Astronomy, and the Biomedical Diagnostics Institute, School of Biotechnology and the School of Nursing and Human Sciences in the case of the BSc in Biomedical Sciences.

With the limited resources available, the School should review whether the desired learning outcomes of the specialised programmes can be delivered within the current resources or whether a single programme with built-in options is more appropriate. A single offering would also give the School more flexibility in the long-term given the dependence of specialised programmes on staff recruitment/retention. In addition, the School should use engagement with external agencies and alumni to set-up an advisory board to advise on structure and content of current or future specialised programme offerings. (This advisory board could also help with the Enterprise and Engagement agenda discussed in section 4.4b and 4.4d ).

The programmes provide good hands-on experience for the students with high quality laboratory support albeit with somewhat ageing equipment. The PRG recognised the need for

an upgrade in undergraduate laboratory equipment to maintain standard of excellence in the physics programmes. However, the PRG also noted the relatively high number of laboratory hours within the programmes in comparison to other similar programmes in other universities. Laboratory teaching is highly resource intensive in terms of support by staff and postgraduate student demonstrators, and the need for modern well maintained equipment. The PRG therefore recommends that the School carry out a benchmarking exercise to review the amount of laboratory teaching and assess whether the desired learning outcomes with a less intensive laboratory component.

From meeting with graduates from the programmes who clearly indicated that they had very positive experiences during their time in DCU, there appears to be considerable willingness on the part of alumni in industry to contribute to the School. There currently appears an informal approach to entrepreneurial training for undergraduate students. The PRG suggest that the School develop learning outcomes related to the university strategic objectives in the area of translation and achieve these outcomes by exploiting their links with Industry via INTRA and alumni.

Whilst the Integrated Training Work Placement Programme (INTRA) was identified as a unique selling point of DCU, some inconsistencies in the INTRA experience for students were identified, particularly relating to the Physics with Astronomy programme. The School should ensure an equitable and adequate INTRA experience for all students. In addition, the training and support for INTRA should be moved to earlier years in the programme to ensure students are fully prepared for INTRA, and informed of potential INTRA opportunities, before year 3.

#### 4.4d Engagement

The PRG looked at several aspects of the School's external engagement including outreach activity with schools and the general public, industry partnerships in research and through the INTRA programme as well as its linkages with other organisations both nationally and internationally.

Through CASTeL, the School has significant interaction with schools at both primary and secondary level. Staff and students also provide significant support for Transition Year programmes, Centre for Talented Youth courses, Open Days and a range of activities at events such as Higher Options and BT Young Scientist. Such engagement has significant potential for student recruitment. There may be scope to increase the return from this through, for example, the School keeping a database of school student contacts allowing for possible personalised follow up – e.g. invitations to physics and university events. The PRG would also suggest highlighting the work of CASTeL in the development of innovation teaching methods across all of the degree programmes offered by the School.

The School has good relationships with a range of businesses from SMEs to multi-nationals through its Intra programme and via research groups. Employers noted excellent experiences with student placements. There is considerable scope to develop these relationships and the group noted plans to have an enterprise open day to explore possible opportunities. Employers expressed interest in finding out more about the final year projects and the research groups in the School. It would be useful to have specific follow up with the employers after the student INTRA placement both for feedback and to allow for building up of relationships.

It was noted that it would be useful for students to have some idea about the mechanics of running a business prior to their Intra placement. There is scope for using the University's

current business linkages to provide talks/short courses on such aspects, perhaps as part of the module on professional development with a view towards this being given in second year rather than in fourth year.

The School has a very wide range of contacts with professional bodies both nationally and globally. The 3U partnership with Maynooth University and the Royal College of Surgeons in Ireland is already providing linkages into the School's degree programmes. The PRG considered that it would be useful to explore further use of, for example, shared lectures in areas where the universities can complement each other and similarly with the Dublin Institute of Advanced Studies (DIAS). There are also opportunities for the Physics with Astronomy programme to develop Intra placements with other astronomy departments and facilities and perhaps develop credit system for students taking part in astronomy outreach activities with DIAS.

As noted above in 4.4c, the PRG suggests the establishment of an external advisory board to provide guidance to the School on aspects such as industry linkages. There is considerable scope to use the goodwill of DCU alumni for this, as well as providing direct contact with larger employers.

#### 4.5 User/customer/supplier perspective

During the process of compiling the SAR, students of the School, both undergraduate and postgraduate, on all programmes completed a number of questionnaires and participated in focus groups. The response rate to these questionnaires was high and the results showed a positive student experience, with particular mention of the approachability and enthusiasm of lecturers in the School. Nevertheless, it was apparent from the responses of the students in the survey included in the SAR, that teaching and learning is an area where the strains imposed by the ECF are beginning to show, with a consequent reputational risk to the university. Several issues were raised, with particular focus on the out-of-date lab and ageing computer facilities. Whilst computing facilities have recently been upgraded, the undergraduate laboratories have not. Some other issues raised related to (i) the cohesiveness of the course structures, particularly in the specialised areas and (ii) the preparedness of students for INTRA in terms of professional development. These issues arose as part of the assessment of teaching and learning and recommendations in this respect are included under that section heading.

#### 4.6 Staff perspective

In preparation for the review, staff across all categories completed a number of questionnaires and participated in focus groups. The reports from these activities indicated a broadly positive working life in the School notwithstanding the severe financial constraints. Issues such as career progression and promotion prospects were raised. It is clear, though, that the School has maintained a warm, collegial atmosphere which is valued highly by both staff and students.

#### 4.7 Overall analysis of Strengths, Weaknesses, Opportunities and Challenges

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Dedicated and enthusiastic members of staff.</li> <li>• Excellent research output in the last 5 years, 2<sup>nd</sup> in the Faculty in terms of delivering key performance indicators around research activity and excellence <i>per capita</i> and very good International and Enterprise engagement. With reference to standard metrics such as the Russell Group (citations etc.) the School is performing very well, particularly within the resource limits available.</li> <li>• Undergraduate Programmes which are of good quality, delivered through quality teaching, leading to good employability of graduates. Unique and distinctive programmes with innovative teaching methods applied and developed through CASTeL. The Incorporation of an industrial placement is a key distinctive strength of the programmes.</li> <li>• The School offers a collegial, supportive and friendly atmosphere to staff, undergraduates, postgraduates and researchers in a good albeit ageing building infrastructure.</li> <li>• Increasing trend in undergraduate numbers</li> <li>• Excellent and effective outreach through CASTeL and other endeavours.</li> <li>• Research activities are well aligned with the University's core strategic aims.</li> <li>• The relationships with external stakeholders, including alumni, industry, national and international organizations are strong.</li> </ul>	<ul style="list-style-type: none"> <li>• Decreasing staff numbers, both academic and technical. The Physics with Astronomy programme is supported by just one lecturer on a 5 year contract and there is no discipline expert academic against the Physics with Biomedical Sciences programme. The School only has 4 full-time technical staff as a recent retirement has not been replaced. The above situation particularly impacts negatively on the School's teaching performance.</li> <li>• Reduced budget and research funding – impact on research infrastructure and postgraduate numbers The reduced Faculty budget, which reflects the overall reduction in Government funding for 3<sup>rd</sup> level education nationally, impacts the laboratory facilities in undergraduate laboratories as well as the staffing deficit detailed above. The overall reduction in, and increased competition for, national and international research funding has impacted negatively on postgraduate numbers and will impact in the future on overall research performance.</li> <li>• Ageing laboratory equipment</li> <li>• Lack of PMDS and career planning for staff and researchers</li> <li>• Lack of succession planning and development or networking for Head of School</li> </ul>
Opportunities	Challenges
<ul style="list-style-type: none"> <li>• Recruitment of new staff with research areas that align with the School/University strategic plan in next 5 years and beyond to fill retirement positions and plan for future retirements.</li> <li>• Renewed interest in Science and Technology leading to increased student recruitment, higher points/higher quality intake</li> <li>• To be a leading voice in shaping the future of Physics undergraduate and postgraduate education in next 15 years in the context of Government-driven rationalisation of 3<sup>rd</sup> level institutions including DCU Incorporation Project, underpinned by the existing pedagogical research in CASTeL</li> <li>• Recruitment of PGs via non-traditional income streams by leveraging existing industrial links via BDI, INTRA and enterprise activities, e.g. employment based IRC PG scholarships.</li> <li>• Potential to exploit industrial links to increase 'business readiness' of graduates.</li> <li>• Potential to strengthen links with key providers in specialist areas such as Maynooth University and DIAS.</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainability of the School – decline in core funding which affects updating and maintenance of laboratory facilities and staff funding – little succession planning, e.g. full time academic staff in the School have fallen from 18 in 2010 to 15 and the School has no staff under the age of 30 with 3 retirements due in the next 5 years.</li> <li>• Reduced postgraduate funding opportunities</li> <li>• Career structures and strategic recruitment</li> <li>• Maintaining a leading role in strategic direction setting and maintaining leadership role of School in key research areas within DCU, nationally and internationally</li> <li>• Changing university landscape nationally</li> </ul>

## 5. Recommendations for Improvement

### Indication of Priority:

P1: A recommendation that is important and requires urgent action.

P2: A recommendation that is important, but can, or perhaps must, be addressed on a more extended time scale.

P3: A recommendation which merits serious consideration but which is not considered to be critical to the quality of the ongoing activities.

### Level(s) of the University where action is required:

A: Area under review

U: University Senior Management

No.	Priority	Level	Recommendation
			<b>Strategy</b>
1	P1	A	Develop a School level strategy/PR brochure which highlights the significant way in which the School contributes to the Faculty and University and clearly publicises the School's outstanding contribution to the DCU Strategic plan internally and externally.
			<b>Organisation and Management</b>
2	P2	A	Develop a transparent semi-quantitative workload model.
3	P1	A/U	Facilitate appropriate leadership development and succession planning.
4	P2	A/U	Facilitate a structured mentoring system and networking opportunities for heads of School and other School based leaders.
5	P1	U	Re-introduce the Performance Management Development Scheme.
6	P1	U	Continue efforts to centralise timetabling to facilitate inter-School and inter-faculty activity.
7	P2	U	Make budgeting more transparent at Faculty and School level.
			<b>Staffing and Accommodation</b>
8	P1	A	Prepare and present future staffing strategy to senior management.
9	P2	A/U	Consider how to recognize the contribution of staffing groups appropriately.
10	P1	U	Ensure the estates maintenance programme is fit for purpose and communicate it effectively to the wider University.
			<b>Research</b>
11	P1	A	Consider consolidating research groups into a smaller number of research clusters.
12	P2	A	Ensure adequate communication to PhD students about the Structured PhD programme.
13	P2	A	Leverage the INTRA programme for industrially funded PhD students.
14	P2	A	Explore participation in /leadership of COST/ ITN programmes as a means of PhD funding and of evening the distribution of PGR students in the School.
15	P1	A	Project CASTeL as a nationally leading research institute.

16	P2	U	Examine the feasibility of a University/Faculty funded Graduate Teaching Assistants programme.
17	P3	A/U	Develop a coordinated approach to Irish Research Council / graduate funding with Vice-President for research.
			<b>Translation &amp; Enterprise</b>
18	P2	A	Develop marketing material for research strengths using support from the Hubs.
			<b>Teaching &amp; Learning</b>
19	P1	A	Evaluate the sustainability of the MSc in Plasma and Vacuum Technology.
20	P1	A	Review the three main undergraduate programme offerings to consider whether they deliver the desired learning outcomes in the present form or where a single programme with built-in options is more appropriate.
21	P1	A	Establish a School external advisory board with terms of reference to advise on structure and content of programmes as well as strategy, enterprise and engagement.
22	P1	A	Benchmark the amount of lab teaching against competitors and explore whether the desired learning outcomes can be delivered within a less laboratory-intensive component.
23	P2	A	Address the transformation objective in the DCU strategic plan by developing learning outcomes related to university objectives including science communication, entrepreneurship, team working, adaptability, lateral thinking and aptitude.
24	P2	A	Consider moving aspects of professional development into earlier years (year 2), e.g. interview skills, CV writing, presentation skills, project management, rudiments of business, preparation for INTRA.
25	P2	A	Develop alumni links as a resource for career development advice, INTRA placements and other areas.
26	P1	A	Ensure an adequate and equitable INTRA project experience for all students.
27	P1	U	Maintain excellence in the student experience in Physics by injecting resources into the teaching laboratories.
			<b>Engagement</b>
28	P2	A	In the marketing of Physics programmes, emphasise excellence in teaching innovation and pedagogy through CASTeL.
29	P3	A	Develop external engagements further, particularly with Maynooth University and DIAS to help deliver specialist programmes.
30	P3	A	Track engagement with secondary school students via a School database and record Transition Year / CTYI student links and follow-up with such students in terms of programme recruitment.

## Appendix

### Meetings with Peer Review Group – Quality Review Visit School of Physical Sciences

Meeting No	Name(s)	Position
1	Prof. Colette McDonagh	Head of Physics
2	Dr. Eamonn Cunningham Prof. Enda McGlynn Dr. Tony Cafolla Dr. Jean-Paul Mosnier Dr. Paul Swift	Teaching Convenor & Chair of Astronomy programme Deputy Head Chair of Applied Physics Chair of Physics with Biomedical Sciences Chair of Masters in Plasma and Vacuum Technology
3A	Prof. Greg Hughes Prof. Miles Turner Dr. Lampros Nikolopoulos Dr. Eilish mcLoughlin Dr. Mascha Chernyakova	School of Physical Sciences School of Physical Sciences Research Convenor School of Physical Sciences School of Physical Sciences
3B	Dr. Robert O'Connor Dr. Bert Ellingboe Dr. Paul van Kampen	School of Physical Sciences School of Physical Sciences School of Physical Sciences
3C	Ms. Lisa Peyton Mr. Alan Hughes Mr. Ray Murphy Mr. Des Lavelle Mr. Henry Barry	Administrator School of Physical Sciences Technical Staff Technical Staff Technical Staff Technical Staff
4	Ms. Phylomena McMorow Dr. Ana Terres Mr. Brendan Gillen Ms. Bernadette Dowling	Director, Registry Director, Research Support Finance Manager Senior Administration, Faculty of Science and Health
5	Ms. Joan Kelly Ms. Grace Hickey Ms. Julie McArthur Mr. Sheila Boughton	STEP Research Admin Unit/BioAT Faculty of Science and Health School of Chemical Sciences STEP Research Admin Unit
6	Dr. Odilla Finlayslon Prof. John Carroll Dr. Ciaran Fagan Dr. Conor Burke Dr. Turlough Downes	Programme Chair Chemistry Head, School of Mathematical Sciences Head, School of Biotechnology Associate Director, BDI School of Mathematical Sciences
7	Ross Murray Mark Tutty Susan Hennessy Susan Lowry Eanna Bailey Ruth Chadwick	Applied Physics 1 <sup>st</sup> Year B.Sc in Physics with Biomedical Science Year 2 B.Sc in Physics with Astronomy 4 B.Sc in Physics with Biomedical Science Year 3 Post Graduate Post Graduate
8	Dr. James Fryar Dr. Creidhe O'Sullivan Ms. Hilary O'Donnell Dr. Adrian Guckian Dr. Robert Copperwhite	Sonex (Graduate and Intra employer) External Examiner Dublin Institute for Advanced Studies (DIAS) CEO Ocean Optics Ireland Intra employer RaptTouch
9	Prof. Brian MacCraith Mr Jim Dowling Prof. Eithne Guilfoyle Prof. John Costello Prof. Barry McMullin Mr. Trevor Holmes	DCU President Deputy President Vice-President Academic Affairs (Registrar) Dean of Faculty of Science & Health Dean of Faculty of Engineering & Computing Vice-President External Affairs
10	Prof. John Costello	Executive Dean of Faculty of Science and Health
11		All School staff invited