

ANNUAL REVIEW

2016



IPEM Institute of Physics and
Engineering in Medicine





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IPEM Institute of Physics and
Engineering in Medicine

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President's Report

New strategy, new values

In 2016 IPEM continued to develop and strengthen its reach and impact in pursuit of its charitable objectives 'to promote for the public benefit the advancement of physics and engineering applied to medicine and biology and to advance public education in the field'. There has been much activity during the year and many successes, as highlighted in the detail of this report, but I would like to highlight a few activities that have particular relevance to me.

The first is the completion of a comprehensive strategic review of the Institute and the production of new strategic aims and values for the organisation.

Our new strategic objectives are:

- Setting and influencing standards and best practice
- Supporting and influencing research and innovation
- Influencing and engaging with national and international bodies
- Influencing and delivering education, training and Continuing Professional Development (CPD)
- Strengthening public engagement and influencing decision makers

There are a couple of new points in these aims which are important developments for IPEM; the first is the inclusion of the word 'influencing' in all our aims and the second the focus on engaging with international bodies.

Together these aims give a very clear mandate, not just to be active and engaged, but also to influence at all levels across all the broad activities that represent our broad membership base both nationally and abroad; I note there is nothing in our charitable objectives that confine our activities to the UK only.

Examples of the new international focus include the attendance of IPEM at the first European Congress of Medical Physics in Athens and at the 22nd International Congress on Medical Physics in Bangkok. I also attended the annual conference of the Association of Medical Physicists of India (AMPI) in Hyderabad. The outcome of these activities included the international adoption of our successful 'Science for Patient Benefit' campaign, a new Memorandum of Understanding signed with AMPI and a rekindling of our relationships with the European Federation of Organisations for Medical Physics (EFOMP) resulting in IPEM offering, and being accepted, to host the EFOMP council meeting in the UK in September 2017. On a personal note it is humbling to see how many of our colleagues internationally have significantly less resources than we do in the UK and how even small levels of support can make a big difference to them.

We have also sought to influence nationally as shown by our developing relationship with the Chief Scientific Officer's team at NHS England. IPEM will continue to work with all of the relevant agencies to ensure that the UK has the resources required across all sectors for the safe and effective delivery of physics and engineering in medicine and the development of new technologies for future improved and effective patient care. Several key influencing activities in 2016 will hopefully come to fruition in 2017.

In 2016, for the first time, IPEM also formally identified its values, which are: Collaborative, Innovative, Objective, Principled, Inspiring, Open and Diverse, which are all fine words but when brought together into a values statement, to me summarise IPEM's 'identity' and set out our culture for delivering on the strategic aims in the coming years.



Another key breakthrough in 2016 was finally getting traction on the 'Model brick' Linac project. The aim of this is to give every child having radiotherapy in the UK a set to play with to help them, through play, with the anxiety of this treatment. The breakthrough came from collaboration with another charity, Fairy Bricks, who give LEGO® bricks to hospitals for children to play with. This project is a great example of our values in action.

Finally I would again like to pay tribute and thanks to the hard work and support of our many volunteer officers and members, whose work for the Institute usually comes on top of demanding full-time employment, and our dedicated staff in the National Office, whose activities are essential to the success and smooth running of the Institute.



Professor David Brettle,
President

IPEM values statement

IPEM is an organisation that inspires passion in others to promote science and engineering in medicine for public benefit. To achieve this we will work collaboratively together, and with others, welcoming diversity and innovation as positive energies for change. We will conduct ourselves in an open, objective and principled manner to engender trust and respect from the public, and those we wish to influence, to amplify our impact and ability to deliver our strategic objectives.



Collaborative

Collaboration was a major theme for IPEM throughout 2016, both internationally and within the UK.



David Brettle presenting Advancing Healthcare Award

Following the vote to leave the European Union, the Institute wanted to demonstrate its wholehearted support and continued commitment to working in partnership with European organisations and institutions. Statements to re-iterate that message were sent to the European Federation of Organisations for Medical Physics (EFOMP) and also to the European Alliance for Medical and Biological Engineering & Science (EAMBES).

Internationally, IPEM attended the first European Congress of Medical Physics in Athens (organised by EFOMP) and was also at the 22nd International Conference on Medical Physics

(ICMP), organised by the International Organization for Medical Physics (IOMP). The Institute also continued to provide administrative support to both EFOMP and IOMP, as well as the International Union for Physical and Engineering Sciences in Medicine.

IPEM also supported numerous members to contribute to national, European and international standards groups and working parties in order to ensure expert advice was available to bodies producing key standards in medical physics and clinical engineering to ensure safety and high quality healthcare for patients. Some examples of this included:

- The Magnetic Resonance Special Interest Group (SIG) led a medical devices directive working party between IPEM, the British Institute of Radiology and the British Chapter of the International Society for Magnetic Resonance in Medicine regarding the impact of new European regulations that may affect in-house manufactured devices, including software.
- Links between the Radiotherapy Interdepartmental Audit Group and colleagues across Europe continued to develop through the European Society for Radiotherapy and Oncology (ESTRO) with a workshop being held at ESTRO headquarters in Brussels,

attended by 50 participants from 16 countries.

■ IPEM continued to be represented on the board of directors of the American Board of Magnetic Resonance Safety as an international member.

■ The Institute was added to the Association for the Advancement of Medical Instrumentation, based in America, as a professional body with members responsible for Healthcare Technology Management.

■ The Clinical Engineering SIG held initial talks with the international Emergency Care Research Institute and the UK's Institute of Healthcare Engineering & Estate Management to develop closer working relationships.

■ The Diagnostic Radiology SIG became an active member on the newly formed Public Health England dose audit working party, looking at the future provision of national dose audit for x-ray examinations.

■ The Radiation Protection SIG opened dialogue with regulators in the four devolved administrations to increase interaction between them.

Two new Memorandums of Understanding (MoU) were signed with partner organisations during the year. In February, IPEM renewed its MoU with the Association of Renal Technologists and during the ICMP in Bangkok in December, a new MoU was signed with the Association of Medical Physicists of India. IPEM President, Professor David Brettle, also met with the British Institute of Radiology's (BIR) new President, Andy Rogers, to discuss how the two organisations, which signed an MoU in 2015, can work more collaboratively together.

Closer to home, the Institute chaired the Clinical Imaging Board until September; this national trilateral body provides leadership and advice on imaging matters. It was also a member of the Radiotherapy

Board with the same partners. IPEM also worked with four other organisations in the Consortium for the Accreditation of Sonographic Education (CASE) to assure the quality of relevant courses and to therefore ensure that health professionals trained on these courses can provide high quality imaging services. During 2016, a new body, the Chartered Society of Physiotherapists, was welcomed into the membership of CASE.

IPEM's Public Engagement Panel, a network of volunteers who are not part of the health-related physics, engineering or technologist professions and who are not members of the Institute, evaluated and commented on material such as 'The Science & The Scientists' leaflets and the Science for Patient Benefit campaign. Two members also joined the Register of Clinical Technologists' management panel, two were trained as internal auditors for IPEM, and two helped to judge the Patients as Partners in Science award at the Advancing Healthcare Awards.

IPEM also partnered with the BIR to give a presentation to members of the highly influential Parliamentary & Scientific Committee on 'Radiotherapy, the cancer treatment of the past or future?' at the House of Commons in October.



Inspiring

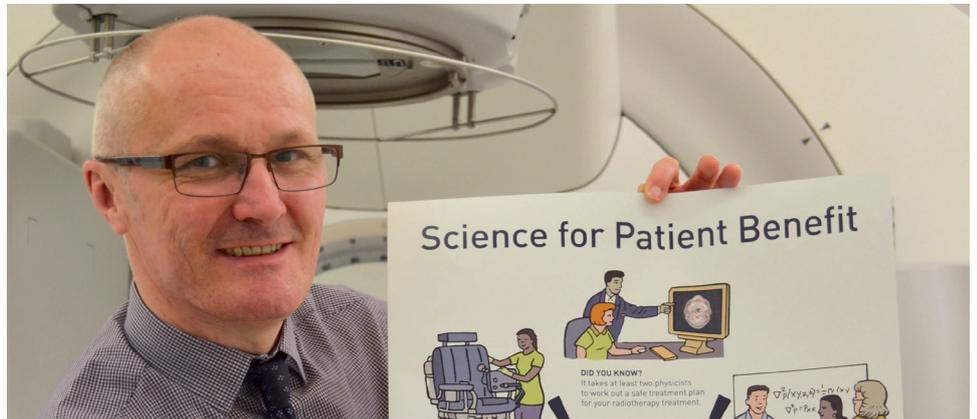
The first ever campaign by the Institute was one of the main features of a year marked by a wealth of inspiring activities by members.

'Science for Patient Benefit' was launched in June and very quickly the campaign, which aimed to invigorate the UK's medical physics and clinical and biomedical engineering professions, gain them recognition amongst their peers, and demonstrate to patients and the public that 'without physics and engineering there would be no modern healthcare', gathered momentum.

Around 70 members across the country volunteered to be hospital 'champions' of the campaign, which had the backing of Professor Sue Hill, the Chief Scientific Officer for NHS England and Dr Brendan Cooper, President of the Academy for Healthcare Science. Those volunteers received a free mug, designed by members of IPEM's Trainee Network, as a 'thank you' for volunteering.

The campaign also spread to Europe and the rest of the world, with the campaign posters being translated into several languages – and it was even used in a rally through the streets of Jaipur in India as part of celebrations to mark the International Day of Medical Physics!

The first ever Global Clinical Engineers Day was marked during the year as well, with a series of events around the world. IPEM members played their part in celebrating the day, as Professor Daniel Clark, Head of Clinical Engineering at Nottingham University Hospitals NHS Trust, delivered a talk at Warwick University on 'Healthcare Technology Innovation & the Future'.



Honours and awards abounded in 2016, starting with former IPEM President Professor Stephen Smye being awarded the OBE in the New Year's Honours List.

The prestigious Chief Scientific Officer (CSO) Healthcare Scientist of the Year Award went to IPEM Fellow Professor Wendy Tindale OBE, consultant Clinical Scientist and Scientific Director at Sheffield Teaching Hospitals. Anthony Higgins, a Clinical Scientist from Leeds Teaching Hospitals NHS Trust, won the Rising Star Award for Medical Physics and Engineering at the CSO awards.

Trainee cardiac physiologist Stephanie Smith and her colleague Stuart Allen, of the Central Manchester University Hospitals NHS Trust, won the IPEM award in the Patients as Partners in Science category at the Advancing Healthcare Awards.

A new set of Gold Medal awards took centre stage at the annual Medical Physics and Clinical Engineering Conference (MPEC) in Manchester,

where they were presented to IPEM members who had made outstanding contributions in their area of work. The prizes and awards programme, which was fully updated and revised in 2015, introduced Gold Medal awards for IPEM members who have made outstanding contributions in academia, innovation and healthcare, as well as recognition for the achievements of early career members.

MPEC also saw a birthday party held to mark the 60th anniversary of IPEM's prestigious international journal Physics and Medicine in Biology, with Editor Simon Cherry in attendance to cut a specially-commissioned cake for the occasion.

Also in 2016, IPEM Fellow Professor Andy Beavis was awarded the Society of Radiographer's Silver Medal for his contribution and services to radiography.

Finally, a new international award for excellence in medical physics was

won by IPEM member Professor Paul Marsden, Professor of PET Physics and Director of PET Medical Physics at King's College London and Guy's and St Thomas' PET Centre. He was awarded the inaugural John Mallard Award by the International Organization for Medical Physics. This honours the pioneering work of Professor John Mallard OBE, who played a crucial role in the development of two of the world's most important medical technologies – Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET).

An inspiring IPEM member was appointed to a prestigious national scheme to encourage the next generation of female scientists. Consultant clinical scientist Dr Charlotte Kemp, who is Head of Clinical Measurement at South Tees Hospitals NHS Foundation Trust, was one of four recipients of the first Women in Science and Engineering Fellowship scheme set up by the Chief Scientific Officer for NHS England.

Elsewhere, a record number of outreach sessions were held (more than 90 throughout the year) by members of IPEM's outreach network, ranging from the large Big Bang National Science Fair to careers days and small classroom visits, reaching several thousand young people.

Three major public lectures were held, with talks given by members to the York Philosophical Society and the Ebor Probus Club. IPEM also participated in the York Festival of Ideas, with a lecture from member Professor Tony Barker, the pioneer of Transcranial Magnetic Stimulation of the brain. IPEM member Jenny Marsden also took part in Soapbox Science in Hull.



A number of IPEM members became Fellows during 2016 and they were:

- Ms Claire Greaves, Head of Medical Physics and Clinical Engineering, Nottingham University Hospitals NHS Trust
- Dr Ashraf Khir, Reader in Cardiovascular Mechanics, Brunel University
- Dr Ian Piper, Principal Healthcare Scientist, NHS Greater Glasgow & Clyde, Queen Elizabeth University Hospital
- Dr Richard Scott, Head of Department at Sheffield Teaching Hospitals NHS Foundation Trust
- Dr Emiliano Spezi, Senior Lecturer at Cardiff University School of Engineering



Finally, we were delighted that our members' magazine SCOPE was recognised at the Professional Publishers Association Independent Publisher Awards 2016. It was a finalist in the Membership Magazine of the Year category, one of six publications competing for the title, which was won by the National Trust magazine.



Diverse

The Institute's commitment to Equality, Diversity and Inclusion (EDI) has always been clear: we had an Equal Opportunities policy as long ago as 2004, and the President signed the Royal Academy of Engineering's (RAE) Engineering Diversity Concordat in October 2013 and the Science Council's diversity declaration in October 2014. This year saw some great progress with both IPEM Trustees and staff identifying new areas to focus on whilst completing actions from the current diversity action plan.

During the year, the IPEM CEO was involved in the development of the 'Diversity and Inclusion Progression Framework' for professional bodies, a joint enterprise between the Royal Academy of Engineering (RAE) and the Science Council.

IPEM was invited to join the group

developing this Framework because of our proactive approach to EDI actions, following our involvement in the RAE diversity project, as we reported last year, and the CEO was invited to speak at the launch event in December.

Following the pilot project, IPEM assessed its own progress against the Framework for the first time. We can say that IPEM compares well to other professional bodies participating in this project and we now have a clear benchmark to move forward from.

Kimberley Saint, the Institute's Trustee lead for EDI, has been communicating regularly with IPEM members, and has heard from members keen to be involved or simply getting in touch to discuss EDI matters. Kimberley is looking forward to sharing the progress we make and would like to invite members to contact her with their ideas or concerns. Role Models

to promote the diversity of IPEM members will be 'launched' in 2017 and we would invite more individuals to get involved, please email: equality@ipem.ac.uk.

During the year, all Trustees were provided with training on EDI, specifically on avoiding implicit bias and unconscious bias. This training is now being made available to all members involved in assessments such as membership Registrars and registration assessors. IPEM has also monitored the gender split of committee members, and continually monitors the diversity characteristics of staff, job and award applicants. We also check our image library, website and publications to ensure that they present a diverse picture of our members and the profession, reflecting IPEM's diversity value which welcomes everyone into the profession and into membership.



Open



The events of 2016 were dominated by the Referendum vote in June to leave the European Union and members were called upon to give evidence to a number of key inquiries, including:

- The House of Commons Science and Technology Committee on 'Leaving the EU'
- The House of Commons Health Select Committee on 'Brexit and health and social care'
- The House of Lords Select Committee on the Long-term sustainability of the NHS, which covered issues raised by the Brexit vote.

In addition, members attended several meetings concerned with Brexit, including the Parliamentary Links Day, which focused on 'Science after the Referendum – what next?' only days after the historic vote, a special Science Council summit on the science profession post-Brexit,

and as a member of the Campaign for Science and Engineering (CaSE), IPEM shared the regular updates CaSE produced with members on what Brexit might mean for the science and engineering sector.

It was not just Brexit which occupied members' time in preparing consultations, and it was not just for committees of the UK Government. Responses were also submitted to the Scottish Government on the Apprenticeships Levy, the Welsh Assembly on the sustainability of the health and social care workforce, the Northern Ireland Assembly on the review of the Public Health Act, and more widely, to the International Commission on Radiological Protection.

The consultation which received the biggest response from members, however, was to NHS England's consultation on Modernising Radiotherapy Services towards the end of the year.

IPEM demonstrated openness in other ways during the year as well. The Public Engagement Panel was involved in the Institute's work, by taking part in internal audit activity, helping to manage the Register of Clinical Technologists, reviewing the Science for Patient Benefit campaign, and having input into the latest in 'The Science & The Scientists' leaflet series.

A new position statement was published, highlighting shortages in the radiotherapy physics workforce, and the Physiological Measurement Special Interest Group produced a new policy statement on the 'Role of Clinical Scientist in Physiological Measurement'.

The Regional Chairs' report highlighted some issues with organising regional meetings, especially in the West Midlands, and has suggested that as a way forward the Institute should consider having regional teams to support the regional chairs. Three regions - the North East, the North West, and Yorkshire & Humber – joined together again to deliver a very successful second northern regional meeting in 2016 and planning is underway for the third.



Innovative

A HOST of firsts marked 2016 as a year for IPEM and its members to remember for a variety of reasons.

The first ever free Members' Day at the annual Medical Physics and Clinical Engineering Conference (MPEC) was a huge success. More than 320 people attended the three-day conference, which was held at the Business School of Manchester Metropolitan University – the European City of Science for 2016 – with more than 180 attending the Members' Day alone. Another innovation at MPEC was a Question Time session held during Members' Day, which enabled delegates to put questions to a panel of IPEM representatives about policy and strategy.

Another first in 2016 was the setting up of the international Editorial Advisory Board for IPEM's new ebooks series. This is a collaboration between IPEM and its long-standing journal publishing partner, the Institute of Physics Publishing (IOPP), to create the defining collection of ebooks in medical physics and biomedical engineering. The Board, chaired by IPEM Fellow Professor Frank Verhaegen, met twice during the year and started to commission books for the series, with the first one expected to be published in 2018.

Professor Verhaegen was also one of five recipients of almost £50,000 from IPEM's Innovation Fund to support a range of projects which were led by members. The Innovation grants are for the purchase of equipment or services to facilitate short term innovation and research projects.



320

People attended the three day conference for MPEC



180

People attending Members' Day in 2016

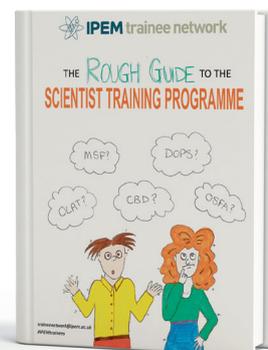
The Institute revised and relaunched the clinical technologist training programme during the year, with set start and assessment dates to make it more structured for trainees. The Professional and Standards Council began discussions on the potential for IPEM to provide alternative training routes to registration, given external workforce pressures.

Also launched during the year was the Register of Clinical Technologists (RCT) equivalence route for those working under the physics scopes of practice, the engineering equivalence route having gone live in late 2015. The RCT has seen a growth in registrants from those previously unable to join via the primary routes and in September it was re-accredited by the Professional Standards Authority (PSA).

Guidance for the Scientist Training Programme (STP) trainees was produced during 2016 by IPEM's Special Interest Groups and this was supplemented by the IPEM Trainee Network, who revised and released a new version of *The Rough Guide to the Scientist Training Programme*. The guide, written by former trainees who want to pass on their experiences of the training, contains a wealth of hints and tips to help new cohorts to get through the STP training.

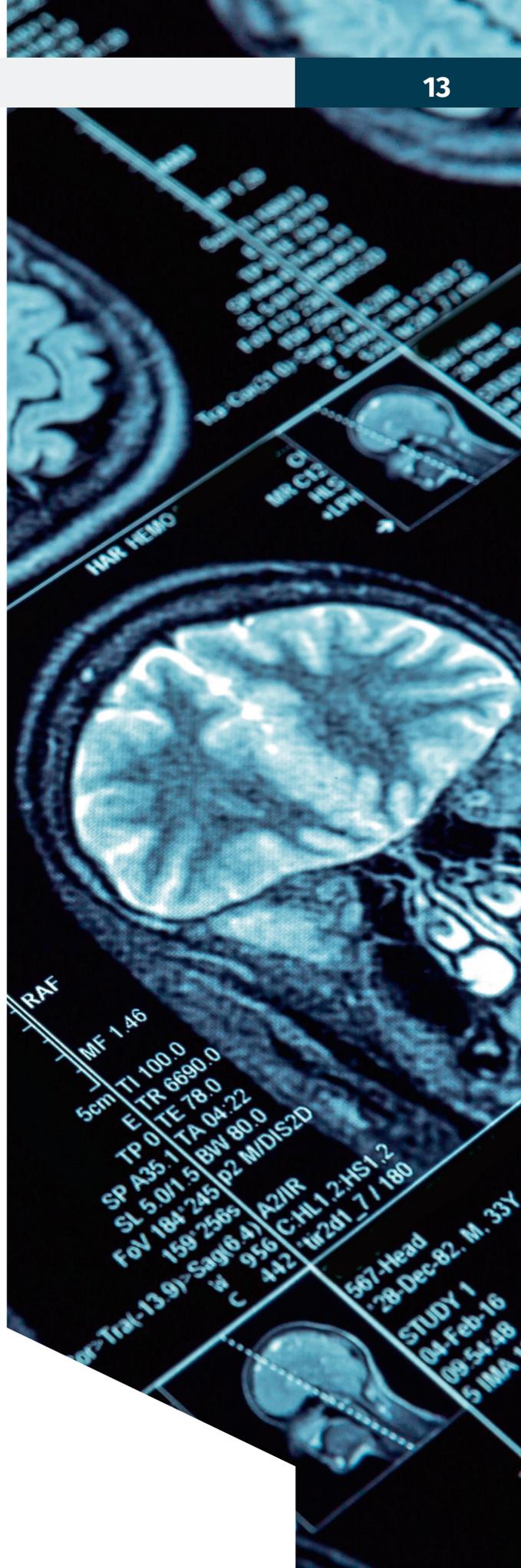
There had been a long-held aspiration by the Institute to create a new category of membership for professionals working with applications of physics and engineering applied to medicine who are registered professionals other than clinical scientists or clinical/biomedical engineers, such as doctors, radiographers, nurses, vets or dentists.

This finally came to fruition in late 2016 with the opening of the Professional Affiliate Membership category and the very first member to join was Richard Payne, an Assistant Professor of Veterinary Anatomy at the University of Nottingham's School of Veterinary Medicine and Science. Congratulations to him, and the other vets, radiologists and fellow professionals who have since joined him in membership!



Innovation Grant recipients 2016

Name	Title of Project	Amount
Dr Emma Chung Lecturer in Medical Physics, University of Leicester	Diagnosis and monitoring of Brain injury using Doppler ultrasound	£9,743
Professor Nick Donaldson Department of Medical Physics & Biomedical Engineering, University College London	Scaling up a new optical device for pathogen reduction in blood plasma	£9,972
Dr Andrew Reilly Radiotherapy Physics Department, Altnagelvin Cancer Centre, Londonderry	Implementation and Assessment of kV Dual-Energy CBCT (DE-CBCT) in Radiotherapy using a Clinically Available Linear Accelerator Treatment Delivery Platform	£9,974
Dr Thomas Stone Medical Physics and Clinical Engineering Department, Cambridge University Hospital NHS Foundation Trust	Rapid Fracture Fixation – RaFF	£9,990
Professor Frank Verhaegen Head of Clinical Physics Research at the Maastric Clinic, Maastricht, Netherlands	Development of novel real time in vivo EPID dosimetry for brachytherapy patients	£10,261
		Total: £49,940



Objective

The three prestigious IPEM-owned international journals continued to flourish. In 2016 the contract with the Institute of Physics Publishing to continue to publish PMB and PMea was renewed for five years.

IPEM members continued to work on nine new scientific reports or books to help members maintain high standards of practice and continued the review of policy statements, which provide expert advice from the Institute on a range of technical and scientific issues.

A position statement highlighting shortages in the radiotherapy physics workforce was published, and the Informatics and Computing Special Interest Group (SIG) produced a policy statement on Role of Medical Physics and Clinical Engineering in Health Informatics and Computing.

The Radiotherapy SIG produced the first in a new IPEM series of topical reports, published in IPEM journals with rapid production times and timely topics. 'Guidance on implementing flattening filter free (FFF) radiotherapy' became the most downloaded article in PMB for the year, with almost 5800 downloads in the first three months alone.

The Continuing Professional Development (CPD) audit of registrants entered its second year, which is a requirement of Professional Standards Authority (PSA) accreditation, and the Register of Clinical Technologists (RCT) has developed guidance to help those who are selected for audit to ensure no-one is removed from the register by failing to record their CPD.

The Nuclear Medicine SIG audited nuclear medicine software through the Nuclear Medicine Software Quality Group and also carried out a survey of positron emission tomography (PET) capability and practice.

The Radiotherapy Interdepartmental Audit Group, comprising nine co-operative regional audit groups covering radiotherapy audit for all departments in the UK, ensures that standards are maintained both as new linear accelerators are commissioned and as novel treatment techniques become mainstream. In 2016, flattening filter free audits increased in number and volumetric modulated arc therapy (VMAT), stereotatic radiosurgery (SRS) and stereotatic ablative body radiotherapy (SABR) were audited in many centres. Audits are now being devised to cover new developments such as adaptive and proton therapy.

The Engineering Advisory Group was involved in the Engineering Council's (EC) professional engineering registrations, with 3 CEng and 1 IEng being awarded, and had input into IPEM's response to the EC's paper "21st Century Professional Engineering Institutions" proposals and recommendations.

Finally, the UK Liaison Group, which oversees the work of IPEM's Workforce Intelligence Unit, continued to build an evidence-based picture of the UK medical physics and clinical engineering workforce. The Unit continues to evolve and strengthen the workforce information held. It carried out a survey of the ultrasound physics workforce (with input from the Ultrasound and Non-Ionising Radiation SIG) with ground work covered in order to carry

out effective surveys of the clinical engineering, nuclear medicine and clinical computing workforces.



Physics in Medicine & Biology

Submissions: 1515

Published papers: 581

Number of issues: 24

Impact factor: 2.811

Ranked: 19 (Q1) in the ISI Engineering, Biomedical category and 32 - in the ISI Radiology, Nuclear Medicine & Medical Imaging category. The increase in the Impact Factor (up from 2.761 in 2015) cemented PMB's place as the leading international medical physics journal.

Physiological Measurement

Submissions: 527

Published papers: 188

Number of issues: 12

Impact factor: 1.576

Ranked: 46 - in the ISI Engineering, Biomedical category.

Medical Engineering & Physics

(Published by Elsevier)

Submissions: 721

Number published: 210

Number of issues: 12

Impact Factor: 1.619

Ranked: 45/76 in the Engineering, Biomedical category.

Principled

During the latter part of 2015 and in early 2016, the Institute carried out a comprehensive review of its strategic objectives. As part of the review, it consulted with members through regional meetings, holding a members' survey, hosting a strategy day and creating a dedicated email address for members to submit their views. A special workshop was also held for National Office staff to input their views, teleconferences with the President were held for those who could not travel and for international members, and the Public Engagement Panel was consulted as well.

Following the consultation, the Trustees considered all the responses and produced a final new strategy based on what they had heard. In addition to IPEM's charitable aim 'to promote for the public benefit the advancement of physics and engineering applied to medicine and biology, and to advance public education in the field', a clear set of IPEM values was adopted for the first time, and a new mission statement was identified:

'To constantly improve human health by the application of physics and engineering to prevention, diagnosis and treatment of disease through research, innovation, education and clinical practice.'

The new strategic objectives for 2016 to 2019 are:

- To set and influence standards and best practice
- To influence and deliver education, training and continuing professional development

- To support and influence research and innovation

- To strengthen our public engagement and influence decision-makers

- To influence and engage with national and international bodies.

The Trustees also agreed to review IPEM's committee structure in the light of external changes, especially to healthcare scientist training, and following the implementation of the new strategy, to ensure that the Institute is in the best possible position to deliver the new strategic objectives efficiently and effectively.

During 2016, the Trustees also agreed to invest some of the Institute's reserves in an ethical investment fund, to protect their value against erosion by inflation (see Treasurer's report).

As a charity, IPEM's focus is on the public benefit of its activities. We believe that public benefit is achieved by:

- The development of the workforce who work directly or indirectly in healthcare where physics and engineering knowledge and skills have an impact on patient care. Through education, publications, meetings and bursaries, the Institute encourages the development and growth of expertise that will benefit the public and healthcare services.

- Taking an active role in the development and review of standards, regulation and guidance, both at a national and international level, to ensure that a safe, effective and efficient service can be provided both to patients and to all those involved in

receiving and delivering healthcare services.

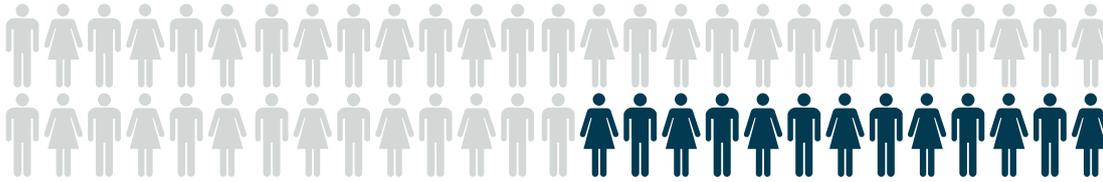
- Support for the development of future services, treatments, and equipment, including the underpinning basic, applied and translational research. The Institute is continuing to develop and strengthen links with academia, research organisations and manufacturers to assist and encourage professionals to progress and implement this work.

- Working with and supporting a range of other organisations to promote and deliver specific and general science objectives.

- Making science more accessible to the general public and engaging with young people to develop their interest in science and engineering.

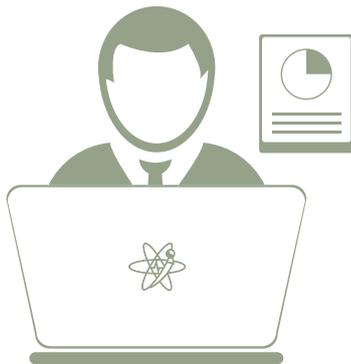
The principal beneficiaries of IPEM's work are patients, whose diagnosis and treatment is undertaken at the highest standards of safety and quality, and who benefit from innovative developments in care and treatment, because of the work of our members.

This may be when members work directly as part of the multi-disciplinary team in hospitals, using the Institute's Reports, standards and guidance; or when they are part of the wider system of academic research, industrial development and translation into practice, supported by IPEM's training, education, CPD, academic publishing, innovation awards programme, scientific meetings, or professional networking activities.



185 NEW MEMBERS
in 2016 total of 4,485

Key information of 2016

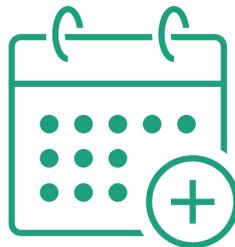


79,431

visitors to IPEM's website in 2016

375

scientific reports sold in 2016



90

new events in 2016

74

new events in 2015

60

new events in 2014

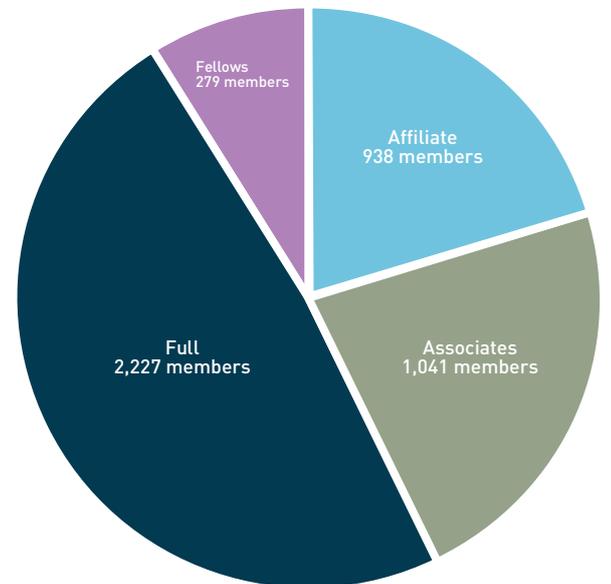
50

new events in 2013

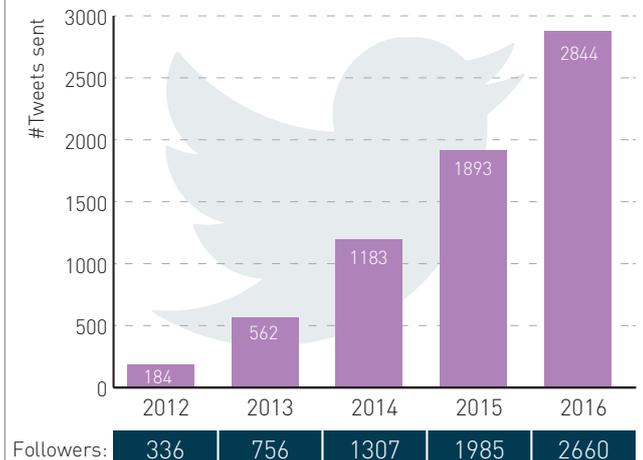
40

new events in 2012

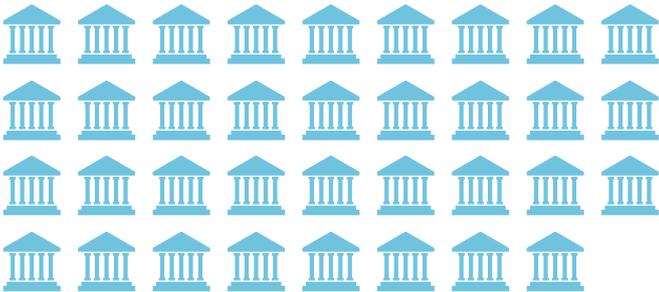
We facilitated, organised and delivered a record number of outreach events in 2016



Twitter followers & tweets made in 2016



IPEM Institute of Physics and Engineering in Medicine



35

IPEM contributed to Government and other policy consultations

1,453 members attended scientific meetings



300 members supported IPEM's work by attending various committees, sub-committees and working parties



£59,303

IPEM handed out in awards, grants and prizes in 2016



10

member representatives on international committees or groups

Clinical Technologist training programme relaunched 100 trainees entered the scheme in 2016



The Continuing Professional Development Audit Panel carried out a successful audit of 157 CPD submissions



9

new scientific reports or books to help members maintain high standards of practice



2,475

Registrants on PSA-accredited Register of Clinical Technologists



Institute of Physics and Engineering in Medicine



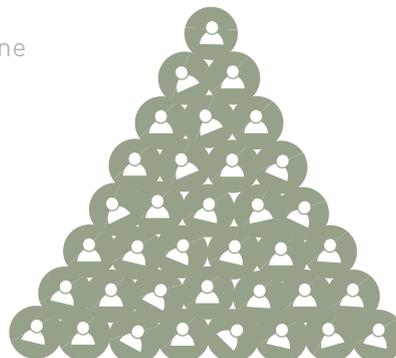
379

Connections in 2014



705

Connections in 2015



1006

Connections in 2016

FOLLOW

 @IPEM_NM_SIG

 @IPEM_RP_SIG

 @IPEM_scope

 @IPEM_UNIR_SIG

 @REBSIG_IPEM

Honorary Treasurer's Report

The budget approved for 2016 was set against a backdrop of 2-3 years of rising costs and falling income for which IPEM has seen an annual operating loss since 2012. The Trustees approved a broadly balanced budget which focused on both income growth and cost reductions. The outturn for 2016 was a small operating surplus of £77,713.

The net surplus for the Institute in 2016 was £77,713, compared to a net loss in 2015 of £110,850, an increase of £188,563 (170.11%). This consists of a net surplus in 2016 on Restricted Funds of £84,617 (2015 net loss of £86,839) and a net loss of £6,904 (2015 net loss of £24,011) on Unrestricted Funds.

The net surplus for the Institute in 2016 consists of £1,321,930 of income, compared to £1,335,898 in 2015, a reduction of £13,968 (1.05%); £1,261,471

of expenditure, compared to £1,446,748 in 2015, a reduction of £184,560 (12.76%) and gains on investments in 2016 of £17,254 (2015: Nil).

The net reduction in the Institute's income totalling £13,968 was made up of: an increase in income from donations of £4,285, an increase in interest receivable of £1,645, an increase in other income of £523, offset by a reduction in income from charitable activities of £2,291 and a reduction in income from trading activities of £18,130.

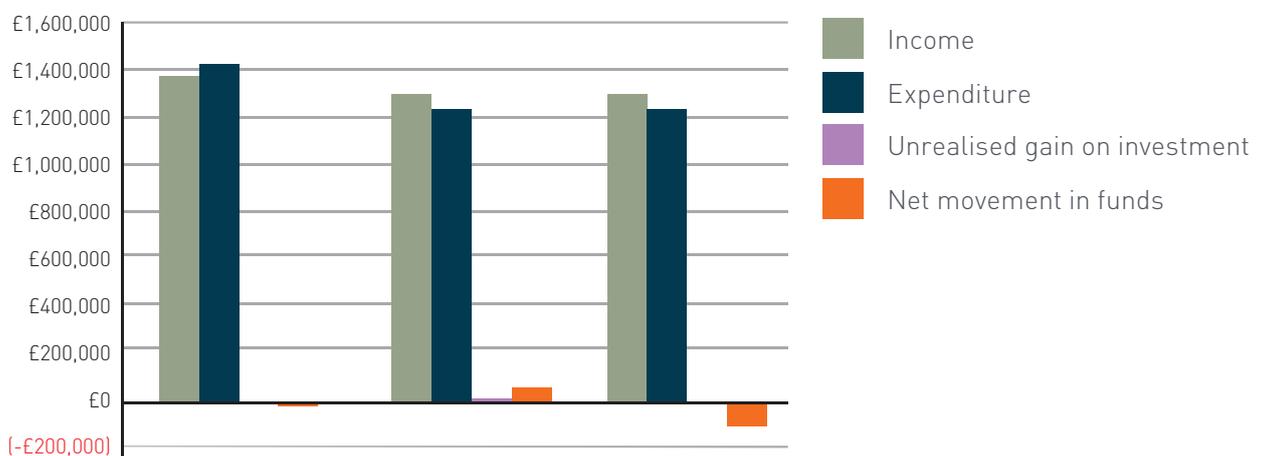
The reduction in the Institute's expenditure of £184,560 was made up of: a reduction in the expenditure on grants, awards and bursaries of £13,974, publication costs of £157,254, and scientific meetings of £43,049, expenditure on raising funds of £717, offset by an increase in the expenditure on professional standards and

development of £29,717.

The Institute's cumulative surplus stood at £2,130,121 at 31 December 2016, of which £443,066 is currently financing net tangible fixed assets.

To address the changing environment and its impact on the Institute's underlying finances, this year the Trustees have implemented some of the plans it made in 2015, in particular, the Institute has invested £750,000 of its reserves in the CCLA - COIF Investment Fund (Accumulated Units) in a phased manner during the period of August – November 2016. This provided the Institute with an unrealised gain of £17,254 in 2016.

Work has now started on the final stages of this plan, which was to develop a long term business and financial plan in addition to the IPEM strategy and annual business plan.



	2016 Budget	2016 Actual	2015 Actual
Income	£1,381,520	£1,321,930	£1,335,898
Expenditure	£1,389,027	£1,261,471	£1,446,748
Unrealised gain on investment	£0	£17,254	£0
Net movement in funds	(£7,507)	£77,713	(£110,850)



David Ellis

David Ellis
Honorary Treasurer

Honorary Secretary's Report

The IPEM Board of Trustees, whose members are also Directors of the Company, met quarterly during 2016. The Board's main responsibility is for governance, strategic, financial and risk matters, though it delegates the detailed scrutiny of finance and risk to the Finance and Business Planning committee.

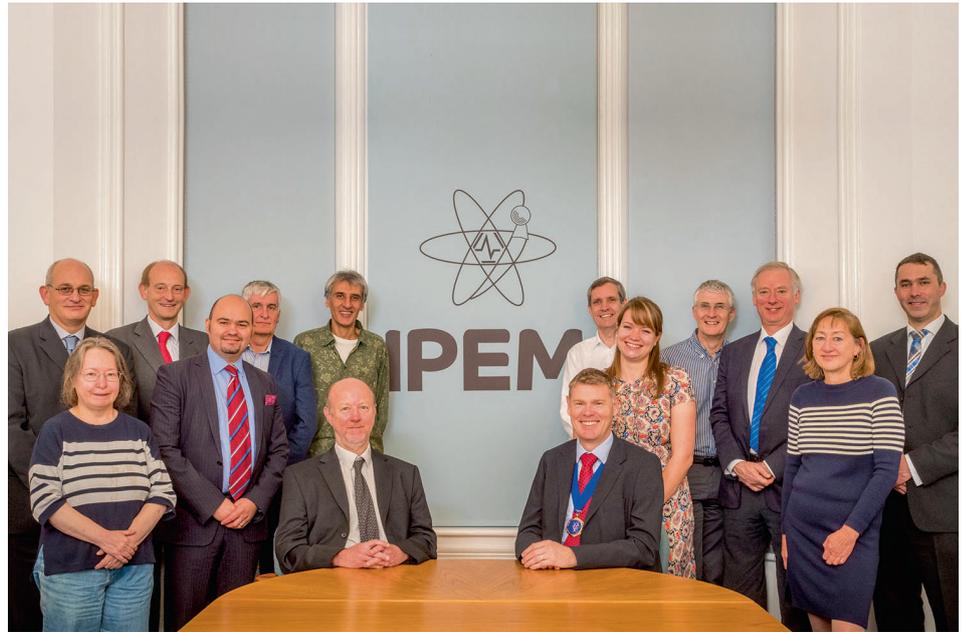
During 2016 we saw the introduction of the following new Trustees:

- **Mr Hugh Wilkins**, Vice President International
- **Miss Fiona Wall**, Vice President External
- **Mr Mark Knight**, Director, Science, Research and Innovation Council
- **Dr Christopher Callicott**, Member Trustee
- **Mr John Turner**, Independent Trustee

Their appointments followed the end of term of outgoing Trustees Dr Elly Castellano, Ms Danielle Ross, Professor Dimitris Visvikis, Miss Siobhan McVey and Dr Anna Barnes.

It is important to reflect that IPEM's activities are for the benefit of patients. Diagnosis and treatment is undertaken at the highest standards of safety and quality with subjects benefitting from innovative developments in care and treatment.

The framework for achieving this goal is governed in IPEM's Articles of Association and can be viewed on our website. On a rolling basis Trustees are individually delegated to ensure good governance of IPEM. In 2016, Professor Peter Hoskins took on the



The IPEM Board of Trustees

role of Acting President from May until August when Professor David Brettle was absent for a prolonged period to ensure continuity of IPEM activity.

Our organisation had another successful year of organising meetings, culminating with the MPEC Science for Patient Benefit 2016 meeting in Manchester. New committee structures are actively being discussed to optimise IPEM efficiency. We have continued to engage nationally at a high level with government departments and other professional bodies. Huge strides are taking place to promote IPEM on an international stage through overseas development, despite uncertainty over Europe.

IPEM is immensely grateful for the inspiration and dedication of all our members and office staff who, in ever more demanding working environments, continue to strive for

excellence in their respective fields to achieve this aim.

It is with regret that we record the deaths of the following members notified during 2016:

- **Professor John Fowler**
- **Dr Dragutin Gvozdanovic**
- **Dr William Jennings**
- **Professor Joseph McKie**
- **Professor Michael Neuman**
- **Professor Wilhelm van der Putten**



Prizes and Awards

Name	Recipient
<p>Healthcare Gold Medal</p> <p>Awarded to any member who has made a substantial and sustained track record at an outstanding level of contribution to the advancement of healthcare practice; related to physics and engineering applied to medicine and biology.</p>	<p>Philip Cosgriff, Head of Nuclear Medicine for the United Lincolnshire Hospitals NHS Trust in Boston, Lincolnshire.</p>
<p>Academic Gold Medal</p> <p>Awarded to any member who has a substantial and sustained track record at an outstanding level of contribution to the advancement of academic practice; related to physics and engineering applied to medicine and biology.</p>	<p>Professor David Bradley, Centre for Nuclear and Radiation Physics, University of Surrey.</p>
<p>Academic Early Career Award</p> <p>For an early career member who has made a significant contribution to advancement of academic practice; related to physics and engineering applied to medicine and biology.</p>	<p>Richard Axell, Cambridge University Hospitals NHS Foundation Trust</p>
<p>Healthcare Early Career Award</p> <p>For an early career member who has made a significant contribution to the advancement of Healthcare practice related to physics and engineering applied to medicine and biology.</p>	<p>Ewan Eadie, Head of Scientific Services for Photobiology and Optical Radiation at Ninewells Hospital, Dundee</p>
<p>Innovation Early Career Award</p> <p>For an early career member who has made a significant contribution to the advancement of innovation in technology, resulting in translation into clinical practice and related to physics and engineering applied to medicine and biology.</p>	<p>Jonathan Taylor, Sheffield Teaching Hospitals</p>
<p>Spiers' Award for Outreach</p>	<p>Belinda Ball, Salisbury NHS Foundation Trust</p>
<p>The Keith Boddy Prize</p> <p>For article in SCOPE in 2015</p>	<p>Robert Ross, Cheltenham Software Quality Management: I know how to program!</p>

International Travel Grant

Lucy Kershaw, Manchester

Visit to Professor Michael Milosevic's laboratory at the Princess Margaret Hospital, Toronto, Canada to examine the use of FAZA PET-MRI to image hypoxia in cervical cancer patients.

Medical Physics and Engineering Conference Prizes**President's Prize for best oral presentation**

Susan Maguire, Dublin, Ireland

A different field for physicists: first experience of pitch side radiological medical physics support

Trainee's Prize for best oral presentation by a trainee

Nicola Laverick, Glasgow

Development of a RapidPlan™ Model for use in the treatment of gynaecological cancers

Poster Prize (1st Prize)

Marios Sotiropoulos, Manchester

Influence of the geometrical arrangement of the gold nanoparticles for the calculation of the local dose enhancement in gold nanoparticle enhanced Proton Therapy.

Poster Prize (2nd Prize)

Graham Lockwood

Investigating Radiotherapy breast tumour bed boosts

Poster Prize (3rd Prize)

Michael Manley

Daylight PDT dosimetry using EBT3 Gafchromic film.

Journal Prizes**The Martin Black Prize for best paper in Physiological Measurement in 2015**

Stephanie Parragh^{1,2}, Bernhard Hametner¹, Martin Bachler^{1,2}, Thomas Weber³, Bernd Eber³ and Siegfried Wassertheurer¹

Non-invasive wave reflection quantification in patients with reduced ejection fraction.

The Jack Perkins Prize for best paper in Medical Engineering and Physics in 2015

Pedro G. Coelho, Scott J. Hollister, Colleen L. Flanagan, and Paulo R. Fernandes

Bioresorbable scaffolds for bone tissue engineering: Optimal design, fabrication, mechanical testing and scale-size effects.

The Roberts' Prize for best paper in Physics in Medicine and Biology in 2015

J Rahmer¹, A Halkola^{2,3}, B Gleich¹, I Schmale¹ and J Borgert¹

First experimental evidence of the feasibility of multi-color magnetic particle imaging

The Martin Black prize References:

1. AIT Austrian Institute of Technology GmbH, Health & Environment Department, Biomedical Systems, Donau-City-Str. 1, 1220 Vienna, Austria
2. Vienna University of Technology, Institute for Analysis and Scientific Computing, Wiedner Hauptstr. 8-10, 1040 Vienna, Austria
3. Klinikum Wels-Grieskirchen, Cardiology Department, Grieskirchnerstr. 42, 4600 Wels, Austria

The Robert's Prize References:

1. Philips GmbH Innovative Technologies, Research Laboratories, Röntgenstraße 24-26, D-22315 Hamburg, Germany
2. Philips Healthcare, Äyritie 4, 01510 Vantaa, Finland
3. Formerly: Institute of Medical Engineering, University of Lübeck, Ratzeburger Allee 160, 23562, Lübeck, Germany

Scientific meetings in 2016

Month / SIG	Date	Title	Venue	Attendees
JANUARY				
IPEM Trainee Network	8th	Trainee day	York	80
Clinical Engineering	27th	Medical Technology of the Future	Manchester	31
FEBRUARY				
Nuclear Medicine	11th	The IPEM Stress Leaders Workshop	Birmingham	14
MARCH				
Academic Advisory Group	3rd	Workshop on MRI Guided Radiotherapy	University of Sheffield	70
Ultrasound and Non-Ionising Radiation	4th	Workshop on the assessment of non-laser optical sources	King's College London	23
APRIL				
Magnetic Resonance	7th	Fetal, Neonatal and Paediatric MR Imaging – Techniques and Applications	Leeds	35
Radiotherapy	20th	VMAT Verification - are we ever going to give it up? Is it time to let it go	St Anne's College, Oxford	78
Diagnostic Radiology	27th	Optimisation in paediatric imaging	Society of Chemical Industry, London	71
MAY				
CTETP	10th	Clinical technologists training scheme training day	Birmingham	35
Radiation Protection	25th	RPA Update	Liverpool	144
Radiation Protection	26th	RWA Update	Liverpool	90
JULY				
Ultrasound and Non-Ionising Radiation	13th – 14th	Ultrasound QA and Workshop	Reading	56
SEPTEMBER				
	12th – 14th	MPEC 2016	Manchester Metropolitan University	320
OCTOBER				
Nuclear Medicine	7th	Quantitative Nuclear Medicine	York	43
Diagnostic Radiology	12th	Current issues in fluoroscopy and interventional radiology	Birmingham	56
NOVEMBER				
Informatics Computing	2nd	Annual IC Conferences	Birmingham	59

Month / SIG	Date	Title	Venue	Attendees
Magnetic Resonance	7th	Diffusion MRI	Geological Society, London	26
Northern	17th	Northern Regional Meeting	York	34
Ultrasound and Non-Ionising Radiation	24th	Optical Radiation Update/LPA	University of Manchester	55
DECEMBER				
Radiotherapy	1st	Advancing Brachytherapy: tumour coverage and accuracy through collaboration	Geological Society, London	55



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Mr Neil Davis London
Mr Adam Selby Wales
Mr Jonathan Taylor Yorkshire & Humber
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External Representatives

IPEM has representation on many external organisations and committees, including the following:

Professor David Brettle

Council, Academy of Healthcare Science

Dr Richard Scott

British Standards Institute

Dr Anna Barnes, Dr Elly Castellano, Dr Rob

Dickinson IoP Medical Physics Group

Professor David Brettle, Mr Martin Graves

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Professor David Brettle, Ms Rosemary Cook CBE

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Professor Panicos Kyriacou

RAE - UK Focus for Biomedical Engineering

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RPA 2000

Professor David Brettle, Ms Rosemary Cook CBE

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Ms Rosemary Cook CBE

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BSI Liaison

Mr Ed McDonagh

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Mr Giles Morrison

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Medical Physics

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BIR Magnetic Resonance Committee and BIR

MR Safety Working Party

Dr David Eaton

BIR Oncology and Radiotherapy Special

Interest Group

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NHSBSP National Breast Screening QA

Co-ordinating Group for Physics

Mr Ed McDonagh

RCR Intercollegiate Informatics for Diagnostic

Imaging Working Party

Mr Will Mairs

NHS England Cancer Diagnostics Clinical

Reference Group

Dr Carl Rowbottom

PHE Patient Safety in Radiotherapy Steering Group

Dr Siu Man Lee

Health and Safety Executive Electromagnetic

Field Implementation Working Party



Staff at the IPeM National Office*

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Kathryn Surtees Head of Operations and Finance

Marie Goodall Executive Assistant

Kelly Burton Office Administrator

Eva McClean Communications and Development Manager

Sean Edmunds External Relations Manager

Candi Colbourn Conferences Manager

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Fiona McKeown External and International Services Manager

Sally Hawking External and International Services Manager

Jo Pearson Membership and Training Manager

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Elaine Gears Membership Services Administrator

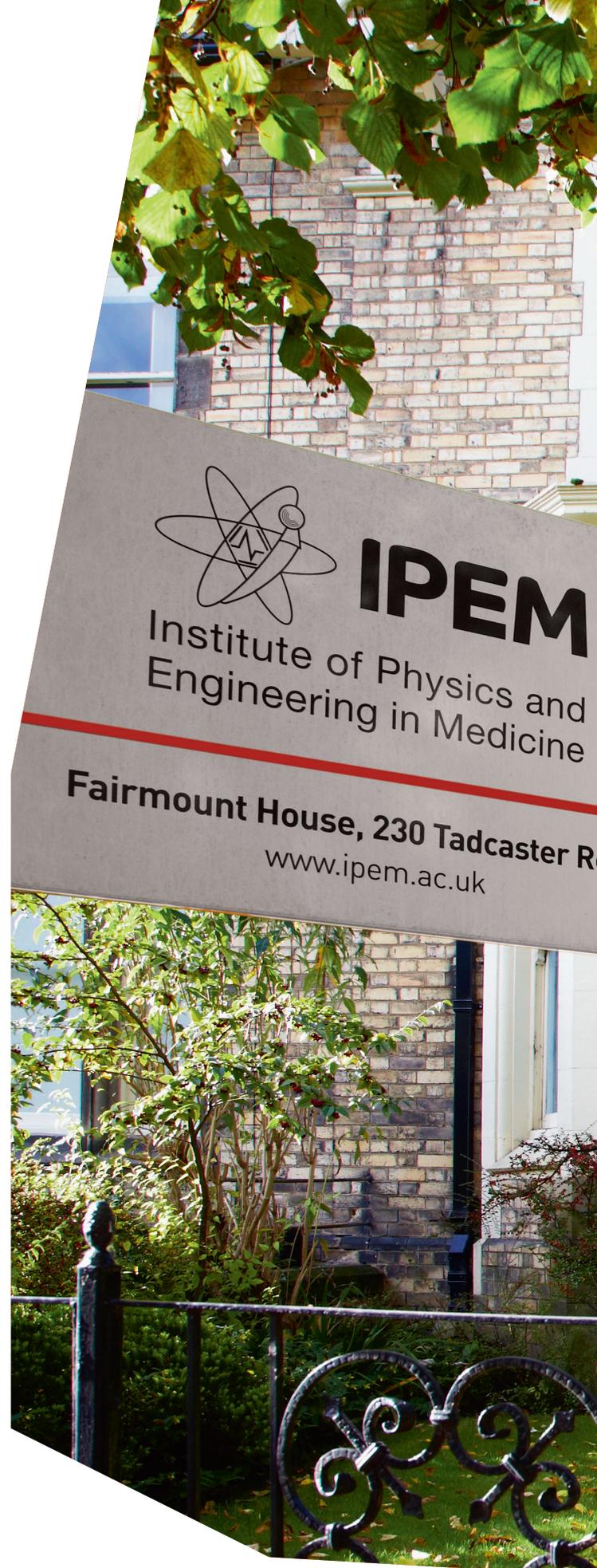
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*as of May 2017





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