

ANNUAL REVIEW 2017



INTERNATIONAL DAY OF MEDICAL PHYSICS

7th November 2017



The cover of this year's Annual Review is based on the poster which was designed for the International Day of Medical Physics 2017, which celebrated women in medical physics to mark the 150th birthday of Marie Curie. We are grateful to all the women who participated in the event.

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IPEM Institute of Physics and
Engineering in Medicine

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President's Report

New President, new partnerships

In 2017 we said hello to a new President as we waved goodbye to another during what was an extremely busy year for the Institute.

A big challenge for IPEM was the search for a new President-Elect at short notice. The search was successful and at the Annual General Meeting, during the MEIBioeng/MPEC conference in the fantastic setting of Sandown Park racecourse, Professor David Brettle handed over the Presidential Chain of Office to Professor Mark Tooley to lead the Institute into its next chapter.

The year demonstrated again that with a strong strategy and values, combined with member enthusiasm and energy, supported by a well-led National Office, we can continue to be successful in delivering on our charitable aims.

Key highlights throughout the year included the joint conference which brought together the Medical Engineering Initiative's Bioengineering 2017 conference, and our own Medical Physics and Engineering conference as 'MEIBioeng/MPEC 2017' at Sandown Park. This was a great example of collaboration and the academic bioengineering presentations were exciting and stimulating.

Another collaborative event was the National Physical Laboratory's meeting on 3D printing in healthcare. This was also a good example of knowledge transfer and was an exciting demonstration of the potential of this disruptive technology.

IPEM was also pleased to host the European Federation of Organisations for Medical Physics (EFOMP) Council meeting in York. This was the first time the meeting had been hosted by IPEM and was only the second time it had been held in the UK. It went very well and several of the EFOMP members travelled on afterwards to MEIBioeng/MPEC to lead an EFOMP session at the conference.

Another highlight of the year was the poster for the International Day of Medical Physics to mark the 150th birthday of Marie Curie. It was fantastic to see so many women medical physicists around the world respond to IPEM's call for a photograph of themselves to be included on a truly eye-catching poster.

The IPEM Science for Patient Benefit campaign received a boost with the Academy for Healthcare Science agreeing to take up the campaign as part of the 'One Voice' agenda for the whole of healthcare science. We look forward to the outcomes of this extended campaign.

Members continued to have success at the Chief Scientific Officer's awards in 2017. IPEM Trustee and Vice President – Industry, Professor Paul White, was awarded Healthcare Scientist of the year, while Past President Dr Chris Gibson received a lifetime achievement award. Glafkos Havariyou, a trainee Clinical Scientist, won the Rising Star award, and IPEM Fellow Joanne Young collected the Science and Engineering Engagement Award on behalf of the team at Southbank University Technical College.

The governance review continued through the year, and key changes were proposed that would be implemented in 2018, once the Trustees had approved them. In addition, a new partner had to be found for the Model Brick Linac project, newly renamed the 'Little Linac' project. This should now be delivered in 2018, with the aim of providing a model kit to every child in the UK undergoing radiotherapy treatment.

During the year, we received the sad news that Professor Peter Wells, the first President of IPEM, had passed away. It was heart-warming attending his memorial service and hearing of the many great things he achieved during his lifetime. It is a fitting



testament to his initial leadership that IPEM is still going strong today.

Finally we would like to thank all members for their continued contributions to IPEM. The Institute is the members and so much is owed to those who are active in the organisation. We would also like to thank the National Office, led by Rosemary Cook, for their fantastic efforts in keeping IPEM running.



Professor David Brettle,
President



Professor Mark Tooley,
FRCP, FEng, 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.



Sandown Park finish line

Setting and influencing standards and best practice

The focus on standards and best practice, though often invisible to patients during their care, is crucial to patient safety and the best outcomes of care and treatment

A long-awaited step forward was taken in 2017 when IPEM, NHS England and the UK Accreditation Service (UKAS) announced the beginning of the Medical Physics and Clinical Engineering (MPACE) accreditation programme.

A joint statement by the three organisations was issued, a Technical Advisory Committee, under the chairmanship of Dr Peter Jarritt, former IPEM President, was set up and UKAS then released a call for potential pilot sites and specialisms. The year ended with a call by UKAS for Peer (Technical) Assessors to assist in the pilot assessments of the project, who would be part of a team to go into an organisation to confirm competency and compliance to the requirements of BS 70000. The decision to base the MPACE accreditation on BS70000 will provide a route to wider standardization of the accreditation of healthcare science services.

The Radiotherapy Special Interest Group (SIG) published two policy statements, on 'The Roles of the Scientist and Technologist in Radiotherapy Physics' and the 'Provision of a Physics Service to Intraoperative Radiotherapy'. The Radiotherapy Professional Standards Group produced a policy statement on 'Recommendations for the Provision of a Physics Service to Radiotherapy'.

The Magnetic Resonance SIG



published a policy statement on 'The role of the Clinical Scientist in Magnetic Resonance Imaging units conducting human diagnostic imaging', and the Institute also published a position statement on 'Routes of entry to Clinical Scientist registration'.

The Institute's Engineering Advisory Group (EAG) liaised with the Institution of Engineering and Technology Healthcare Technology Network to establish closer links in respect of the publication of core competencies in standards and codes of practice, such as in integration of medical devices, small devices and healthcare applications and cyber security.

The EAG also had representation on the International Federation of Medical and Biological Engineering's Council of Societies, and the International Electrotechnical Commission technical committees. It also identified a need for supporting Professional Engineering Institutes in developing

countries on clinical engineering best practice.

The Institute successfully attained Professional Standards Authority re-accreditation for the Register of Clinical Technologists, which finished the year with 2,458 registrants. During the year, there were 20 new entrants to the Register via the equivalence routes introduced in 2015 and 2016 to allow more of these practitioners to join the Register, so enhancing public protection.

In 2017 IPEM resumed the Chair of the Clinical Imaging Board (CIB). This national trilateral body of IPEM, the Royal College of Radiologists and the Society and College of Radiographers, provides UK-wide leadership and advice on imaging matters. The CIB released the results of a survey urging hospitals to formulate clear plans to replace outdated equipment after it was revealed half of healthcare



organisations do not have set renewal plans, and more than a third of older magnetic resonance imaging (MRI) scanners are not scheduled for replacement.

IPEM also worked with five other organisations in the Consortium for the Accreditation of Sonographic Education (CASE) to assure the quality of relevant courses so that health professionals trained by them can provide high quality imaging services. During the year the College of Podiatrists was welcomed into the membership of CASE.

IPEM also asked members for their views in the general membership survey, which was open for responses from June until October, and also in the Equality, Diversity and Inclusion (EDI) survey, which was the Institute's first comprehensive EDI survey. The findings and recommendations of both surveys are in the members' area on the IPEM website.

The Institute's commitment to EDI continued to build on the great work done in the previous year in this area. Christine Usher, a Member Trustee, was appointed as a new Board level champion for equality during the year. IPEM also piloted the new 'Diversity and Inclusion Progression Framework' for professional bodies, a joint enterprise between the Royal Academy of Engineering and the Science Council. Also during 2017, IPEM launched the Network Mentors programme to increase the visibility of underrepresented groups.



*Dr Stephen O'Connor,
Chair of Fellowship Panel*



*Andy Mosson, outgoing RCT Registrar,
being thanked for his service by Iain
Threlkeld, the new RCT Registrar*



*Christine Usher, Member Trustee
and IPEM's equality champion*

IPEM sets high standards for progression through the membership grades and the following Full Members became Fellows during 2017:

- Dr Anna Barnes, of University College London Hospital and IPEM's former Vice President External

- Professor Tim David, of the University of Canterbury in Christchurch, New Zealand

- Dr David Eaton, of Mount Vernon Hospital and Chair of the Radiotherapy Special Interest Group

- Dr Mark McJury, of the Beatson West of Scotland Cancer Centre in Glasgow

- Dr Phil Riches, of the University of Strathclyde

- Dr Scott Semple, of Queen's Medical Research Institute in Edinburgh

- Dr Jacqueline Shipley, of the Royal National Hospital for Rheumatic Diseases in Bath

Influencing education, training and CPD

Delivering high standards of education and training not only helps to benefit patients but also ensures that scientists and engineers are well prepared for their roles and IPEM is proud to contribute to scientist and technologist training



Prof David Brett and Prof Mark Tooley

The Institute's training programmes and influence on others' programmes, the accreditation of courses, our CPD scheme, and the administration of both Science Council and Engineering Council registrations are all key ways that IPEM helps to deliver high standards of education and CPD.

Early last year the Health and Care Professions Council announced that it would no longer require Route 2 trainees to follow a six-year route

to registration. IPEM immediately updated the 2014 Position Statement, which reiterated the Institute's commitment to this pathway.

This news came as the Professional and Standards Council (PSC) had a new training and education strategy agreed by the Trustees. The PSC's Training and Career Framework group met to discuss the wider aspects of the medical physics career structure and the training routes.

The PSC also investigated IPEM's role in the new system for apprenticeships, with a view to developing a Level 7 Apprenticeship to complement the existing training routes to becoming a Clinical Scientist.

The Engineering Course Accreditation Sub Panel accredited nine undergraduate and six postgraduate courses at two universities for clinical engineering, in partnership with other engineering bodies.

The Continuing Professional Development (CPD) Audit Panel carried out a successful audit of 177 CPD submissions (up from 157 in 2016). The Panel also held regular meetings with the Science Council, which ensures the Institute's CPD scheme is relevant and is working to establish good practice within the profession. A number of excellent examples of CPD across the registers were uploaded to the Training and Workforce pages of IPEM's website to both encourage and promote CPD submissions.

The Clinical Engineering Special Interest Group collaborated with the UK's Institute of Healthcare Engineering & Estate Management and the NHS National Performance Advisory Group to plan a joint one-day educational and practical skills training event to take place in July 2018, aimed at apprentice level technologists and engineers.

The IPEM trainee induction day for the Scientist Training Programme was very well attended and there was some very positive feedback from the day.

The Trainee Network also ran a full day of trainee-led sessions at the MEIBioeng/MPEC at Sandown Park Racecourse. This was the first joint conference, bringing together the academic biomedical engineering community and physicists and engineers working in healthcare. The conference saw the inauguration of new IPEM President Professor Mark Tooley, a wealth of great speakers and a varied programme of talks, lectures and workshops.

The conference also saw the presentation of Gold Medals,

the journal prizes for the best papers published in the three IPEM-owned international journals, and the presentation of the Institute's highest award, of Honorary Fellowship, to Professor Marco Viceconti, an Executive Director of the Insigneo Institute at the University of Sheffield.

As well as MEIBioeng/MPEC, the Institute organised a total of 25 scientific meetings throughout 2017, two more than in the previous year, which also saw attendance rise to 1677 attendees, an increase of 285 people on the 2016 figures (Please see pages 22 and 23 for the full list of scientific meetings).

IPEM's Workforce Intelligence Unit assisted the National Radiotherapy

Imaging Dose Audit Working Party by administering a survey into imaging equipment and protocols. It also carried out a Clinical Engineering Services and Workforce Survey to discover all the different models of Clinical Engineering Services, and how they are resourced. The results of this survey will put IPEM in a position to join up the gaps, provide information to our members, and inform the Education and Training Strategy. The unit also carried out the biannual radiotherapy workforce census, capturing the entire radiotherapy physics workforce, Clinical Scientists, technologists (including engineering technologists), trainees and assistants.

IPEM's three international journals

Physics in Medicine & Biology

Published by: IOPPP

Submissions: 1515

Published papers: 5816

Number of issues: 24

Impact factor: 2.742

Ranked: 34 out of 127 titles in Radiology, Nuclear Medicine & Medical Imaging category

Downloads: 1,081,273. This was the first time ever that more than one million downloads had been achieved.

Physiological Measurement

Published by: IOPPP

Submissions: 473

Published papers: 168

Number of issues: 12

Impact factor: 2.058

Ranked: 37 out of 77 titles in Engineering, Biomedical category

Downloads: 276,048

Medical Engineering & Physics

Published by: Elsevier

Submissions: 650

Published papers: 191

Number of issues: 12

Impact factor: 1.819 (this is for 2016, the latest available)

Ranked: 46 out of 77 titles in the Engineering, Biomedical category



Supporting and influencing research and innovation

Members proved once again throughout 2017 how they are very much at the cutting edge of research and innovation in healthcare, industry and academia



Dr Christopher Gibson CSO Lifetime Achievement Award

At the beginning of the year, Dr Jonathan Ashmore, at the time a MRI physicist at King's College Hospital in London, appeared on BBC Breakfast News to talk about the virtual reality app he had developed to help children experience what a MRI scan is like before they undergo the procedure. He teamed up with Dr Cormac McGrath, lead MRI Clinical Scientist for the Northern Ireland Regional Medical Physics Service, and they further developed the app to create a 360° virtual reality video of the entire MRI journey, from arriving at the department to undergoing the scan itself. They went on to win the Roy Ellis Patient Benefit Award, which was presented to them at the MEIBioeng/MPEC conference.

The first joint MEIBioeng/MPEC conference, which was held at Sandown Park Racecourse, brought together the academic biomedical engineering community and physicists and engineers working in healthcare. It also saw the presentation of Gold Medals to members who had made

outstanding contributions in their area of work:

- Professor David Lurie, of the School of Medicine, Medical Sciences & Nutrition at the University of Aberdeen, was presented with the Academic Gold Medal for his research in the development of MRI technology and its applications.
- The Innovation Early Career Award was presented to Mohammed Atari, Senior Mathematical Modeller at Cyprotex Discovery Limited, in Macclesfield, for his development of a model to predict the properties of novel pharmaceuticals.
- The Healthcare Gold Medal was won by Dr Neil Lewis, Dr David Gow CBE, the inventor of the i-Limb® prosthetic hand, was awarded the Innovation Gold Medal, and Dr Tracy Underwood, a research fellow in radiation therapy at University College London, was awarded the Academic Early Career award.

Three journal prizes were also awarded at MEIBioeng/MPEC, for the best papers published in the three IPEM-owned international journals, with the lead authors presenting their papers at the conference.

Members again swept the board at the prestigious Chief Scientific Officer (CSO) awards:

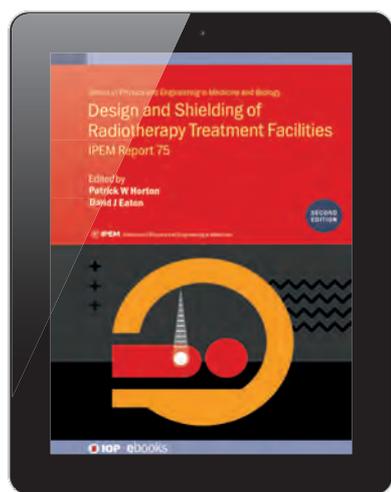
- IPEM Fellow Professor Paul White was named as the Healthcare Scientist of the Year for his work on the use of deceased circulatory donors for heart transplantation.
- Former IPEM President and Fellow Dr Christopher Gibson was presented with a Lifetime Achievement award.
- Glafkos Havariyou, a trainee clinical scientist at King's College Hospital NHS Foundation Trust in London, won in the Healthcare Science Rising Stars category.
- The team at the Southbank University Technical College won the Science and Engineering Engagement Award, which was collected by IPEM Fellow Joanne Young.

Staying with awards, Mark Worrall, a Radiation Protection Adviser at Ninewells Hospital in Dundee, was awarded the first ever British Institute of Radiology/GE Healthcare Radiation Safety Travel Award. This

was for his work on the creation of a computational model to accurately estimate the thickness of an attenuator from a single digital radiograph.

Trainee Clinical Scientist Shaun Warrington, of Nottingham University Hospitals NHS Trust, presented his research poster 'Using advanced MRI techniques to improve the characterisation of Multiple Sclerosis' to parliamentarians at the STEM for Britain awards at Portcullis House in Westminster.

In 2017, the first ebook produced by IPEM's publishing partners, the Institute of Physics Publishing, was released. *Design and Shielding of Radiotherapy Treatment Facilities*, amend to: 'IPEM Report, 2nd Edition', edited by Fellows David Eaton and Patrick Horton, was then quickly followed by *Practical Radiobiology for Proton Therapy Planning* by Bledwyn Jones. The Editorial Advisory Board met twice during the year and commissioned another 10 books for publication in future years.



Innovation Grant recipients 2017

Name	Title of Project	Amount
Dr Ed Chadwick Senior Lecturer in Biomedical Engineering, Institute for Science and Technology in Medicine, Keele University	Intelligent FES for restoring arm movement in people with tetraplegia	£9,781
Dr Seán Cournane Department of Medical Physics and Clinical Engineering, St Vincent's University Hospital, Dublin	Towards establishing clinically relevant energy response correction factors for eye dosimetry in interventional radiology and cardiology	£10,000
Dr Ewan Eadie Photobiology Department, Ninewells Hospital and Medical School, Dundee	Development of a prototype triage phototest device for secondary care identification of abnormal photosensitivity	£8,300
Dr Darren Hart Clinical Measurement Department, Royal National Hospital for Rheumatic Diseases, Bath	Grant used to purchase educational teaching aids developed specifically with the purpose of promoting an interest in electrophysiological measurement	£450
Dr Kevin Howell Institute of Immunity and Transplantation, Royal Free Hospital, London	Can modern microvascular imaging techniques help to assess solid organs for transplantation?	£10,000
Lisa Rowley Lead Clinical Scientist, University Hospitals of Leicester NHS Trust	Design and validation of a dynamic 3-D printed cardiac phantom for hybrid PET / SPECT-CT Nuclear Medicine Imaging	£9,422
		Total £47,953



Strengthening public engagement and influencing decision makers

Brexit has dominated the headlines since the historic Referendum vote in June 2016 and it continued to steer much of IPEM's policy engagement work throughout 2017 as well

The Institute, along with 11 other organisations, funded a new policy officer for the Campaign for Science and Engineering (CaSE), of which IPEM is a member, to look into all aspects of policy analysis concerning the science and engineering community and Brexit.

CaSE also organised a round table discussion on Brexit, which Dr Jemimah Eve, IPEM's Workforce Intelligence Unit (WIU) Manager, attended to highlight, amongst other things, workforce shortages and deficiencies in training places in our specialisms.

The WIU also produced a survey in response to the Migration Advisory Committee's call for evidence on the economic and social impacts of Brexit. The survey went to members in the NHS, academia and industry, seeking tangible data on the percentage of EU and non-EU overseas workers being employed and the added value they bring in terms of skills and experience to the UK market.

The Institute's radiation protection/medical physics expert task group produced a briefing on the requirement for all EU member states to recognise RPEs and MPEs under the Basic Safety Standards Directive.



Throughout the year, IPEM was involved in a range of regulatory consultations and feedback processes during the period leading up to the implementation of the revision of Ionising Radiation Regulations (IRR) 2017 and the Ionising Radiation (Medical Exposure) Regulations 2018. More details on these can be found in the next section on 'Influencing and engaging with national and international bodies'.

Away from Brexit, the Clinical

Imaging Board (CIB), a collaboration between IPEM, the Royal College of Radiologists and the Society and College of Radiographers, published its survey of NHS radiology departments across the UK to gauge the state of MRI equipment and to estimate future MRI workload. The Board also began work on a project to produce leaflets for patients about the balance of risks and benefits involved in modern imaging techniques.

A response was submitted to the Department of Health & Social Care's consultation on 'Promoting professionalism, reforming regulation', and the second consultation by NHS England on Modernising radiotherapy services was responded to.

IPEM's Professional and Standards Council responded to a consultation from the Department for Education on the strategic guidance that should be given by the Government to the Institute for Apprenticeships for the 2017-18 financial year.

The Institute also responded to the National Institute for Health Research consultation on the Future View for NIHR Academic Training. Members of the Radiotherapy Special Interest Group (SIG) also responded to the National Institute for Health and Care Excellence consultation on the Intrabeam radiotherapy system for adjuvant treatment of early breast cancer.

Members also made visits during the course of the year to the Houses of Parliament to take part in events. Fiona Wall, Vice President External, attended the 'Voice of the Future' event, where young scientists and engineers quiz key political figures about the science policy issues that matter to them. David Eaton, Chair of the Radiotherapy SIG, attended a special parliamentary radiotherapy event at the House of Commons, where he raised IPEM's concerns about the current state of the radiotherapy workforce.

In public engagement activities, the Institute continued to work on the

Model Linac project throughout the year. Sadly, IPEM had to end its partnership with a charity who were unable to deliver on the project but towards the end of 2017, work with a new partner got underway.

A number of public lectures were held during the year, including one by the new President Mark Tooley at the Battle of Ideas at the Barbican in London on 'From AI To Big Data: Can Technology Save the NHS?' and IPEM also contributed to the York Festival of Ideas.

Our Public Engagement Panel

members were involved in a wide range of the Institute's work throughout the year, including the CIB leaflet project, the Medical Physics and Clinical Engineering accreditation programme, advising on a new leaflet in 'The Science & The Scientists' series, judging two IPEM awards and providing fundraising ideas.

Member volunteers delivered 80 outreach sessions in schools and universities across the country. Once again, IPEM had a stand at the Big Bang Fair, meeting thousands of young people at the NEC in Birmingham.



Influencing and engaging with national and international bodies

It is said that science knows no borders and certainly IPEM's mission, membership and values are not confined to the UK. The Institute has members in 53 countries across Europe, Asia, Africa, Australasia and the Americas

During 2017 an international strategy was developed, the aim of which includes strengthening and maintaining links with members, non-members and appropriate societies and organisations outside of the UK. It also aims to utilise the Institute's position as one of the first and largest medical physics organisations in the world to act as an international leader in the field.

In support of the International Day of Medical Physics, which in 2017 marked the 150th birthday of Marie Curie, IPEM produced a poster featuring photographs of 150 women medical physicists from around the world. The Institute also sought endorsement from UNESCO for the poster, which was supported by the UK National Commission. As well as being used at several events in the UK, the IPEM poster was downloaded across the world and it featured prominently at the International Organization for Medical Physics (IOMP) conference in India.

IPEM successfully hosted the European Federation of Medical Physics (EFOMP) Council meeting in York. This was the first time the meeting had been hosted by the Institute and it was only the second time the meeting had been held in the UK.

The Institute identified and nominated suitable candidates for a number of volunteer positions within EFOMP, IOMP and the International Federation for Medical and Biological Engineering, which led to IPEM having members on all of EFOMP's committees. IPEM also contributed to a range of international ballots, awards, surveys and policy development. The Institute also collaborated with the European Alliance for Medical and Biological Engineering & Science (EAMBES), which elected IPEM Fellow Professor Panicos Kyriacou as its President in 2017.

The second Global Clinical Engineering Day was supported by IPEM members from across the UK, who had their presentations streamed on the Global Clinical Engineers website, with the UK being the only EU member state to provide a series of videos promoting clinical engineering. The Clinical Engineering Special Interest Group (SIG) also provided a speaker for the Biomedical & Clinical Engineering Association of Ireland's annual conference in Dublin.

IPEM also collaborated with the British Institute of Radiology (BIR) and the Royal College of

Radiologists (RCR) on a national campaign about the vital role imaging plays in modern healthcare. *The Future of Imaging* campaign was launched by Mediaplanet as a supplement in the Guardian newspaper. The supplement was given away at conferences and events and the campaign also featured on Mediaplanet's Health Awareness website.



Members of IPEM's SIGs, committees and panels were involved in a variety of working parties and groups with national and international bodies, including:

- Representatives from the Diagnostic Radiology SIG on the Public Health England dose audit working party, looking at the future provision of national dose audits for x-ray examinations
- Radiotherapy SIG representatives

also attended an International Atomic Energy Agency workshop on IT security and integration in radiotherapy, and a parliamentary event on radiotherapy services. Members engaged with NHS England about plans to redevelop radiotherapy services around regional networks, and RT SIG Chair David Eaton wrote to NHS Digital about plans to cease the secure file transfer service.

- A member of the Public Engagement Panel was selected as the only lay representative on the IPEM / NHS England / UKAS Medical Physics and Clinical Engineering (MPACE) accreditation programme.

- The Nuclear Medicine SIG worked with other professional organisations to support technologist member needs

- The Magnetic Resonance SIG worked with BIR to produce MR risk assessments in line with the Control of Electromagnetic Fields at Work Regulations 2016

- The Radiotherapy Interdepartmental Audit Group continued to build and strengthen links with colleagues in Europe through the European Society for Radiotherapy and Oncology.

IPEM was closely involved with regulatory consultation and feedback processes during the period leading up to the implementation of the revision of Ionising Radiation Regulations



Left to right Prof David Brettle with Prof John Damilakis, President of EFOMP, with the rest of the EFOMP delegates

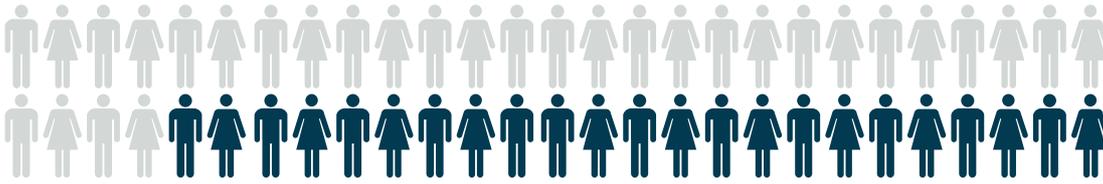
2017 and the Ionising Radiation (Medical Exposure) Regulations 2018. The Institute led on producing a collaborative response to the IRR 2017 national consultation representing medical sector views, together with BIR, RCR and the Society of Radiographers. IPEM also submitted its own response to the IRMER 2018 national consultation, which several SIGs specialising in ionising radiation were involved in.

Expert representatives from IPEM also went to meetings hosted by the Department of Health following on from the consultation on IRMER 2018.

Earlier in the year IPEM hosted a meeting with lead inspectors and policy managers from the Health and Safety Executive. Radiation Protection Advisers and experts

from across ionising radiation medical physics presented medical sector views on IRR 2017 and the associated Approved Code of Practice (ACoP).

IPEM also sent a joint proposal, together with the Association of University Radiation Protection Officers and the Society for Radiological Protection, for certification of Medical Physics Experts (MPE) and Radiation Protection Experts (RPE – including Radiation Protection Advisers and Radioactive Waste Advisers) to the radiation regulators. The document covered proposals on the format of the registering and assessing bodies, the processes for initial and continuing recognition as an MPE or RPE and the principles of common competence across MPE and RPE recognition schemes.



541 NEW MEMBERS
in 2017 total of 5,026

Key information of 2017



83,374
visitors to IPEM's website in 2017
(up from 79,431 in 2016)

408
scientific reports sold in 2016
(up from 375 in 2016)



We facilitated, organised and delivered the following outreach and public engagement events:

80

new events in 2017

90

new events in 2016

74

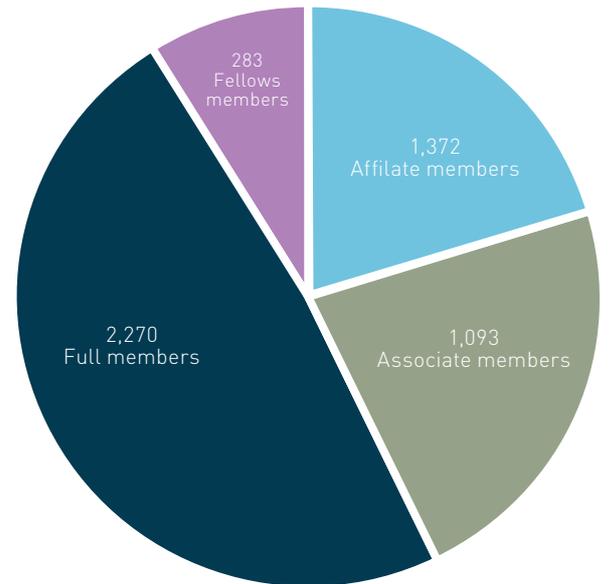
new events in 2015

60+

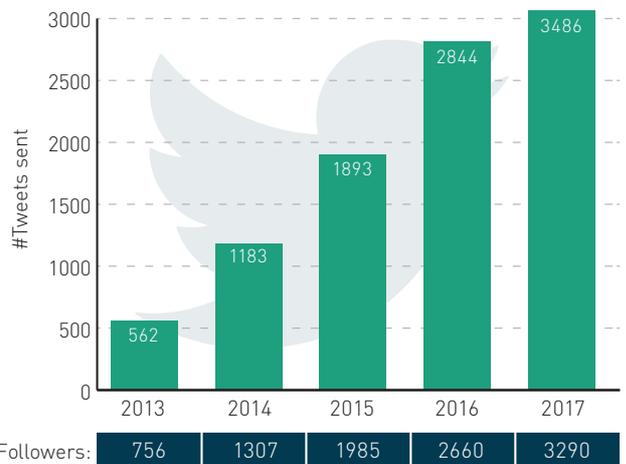
new events in 2014

50+

new events in 2013



Twitter tweets & followers made in 2017



1,000,000

downloads exceeded for the first time ever in 2017 for the IPEM journal Physics and Medicine & Biology

1,677
members attended scientific meetings
(up from 1,392 in 2016)



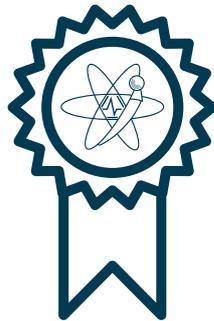

24
IPEM contributed to Government and other policy consultations across the uk in 2017

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



£66,471

IPEM handed out in awards, grants and prizes in 2017



7

International committees or groups provided by IPEM member representatives



scientific reports were published through IPEM's new international ebooks programme

The Continuing Professional Development (CPD) Audit Panel carried out a successful audit of **177** CPD submissions (up from 157 in 2016)



6

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



2,458

Registrants on PSA-accredited Register of Clinical Technologists

in Institute of Physics and Engineering in Medicine



379
Connections in 2014

705
Connections in 2015

1006
Connections in 2016

1280
Connections in 2017

FOLLOW

 @IPEM_NM_SIG

 @IPEM_RP_SIG

 @IPEM_MR_SIG

 @IPEM_UNIR_SIG

 @REBSIG_IPEM

Honorary Treasurer's Report

The budget approved for 2017 was again set in accordance with IPEM's financial strategy of having a balanced budget. The outturn for 2017 was an operating surplus of £283,721. A large amount of the surplus was due to non-recurrent reasons, including better than expected returns from our Journals and better than expected unrealised gains on our Investments in the CCLA – COIF Investment Fund (Accumulated Units).

The net surplus for the Group in 2017 is £283,721, compared to a net surplus in 2016 of £77,713, an increase of £206,008 (265.09%). This consists of a net surplus in 2017 on Unrestricted Funds of £278,521 (2016 net surplus of £84,617) and a net profit of £5,200 (2016 net loss of £6,904) on Restricted Funds.

The net surplus for the Group in 2017 consists of £1,507,441 of income,

compared to £1,321,930 in 2016, an increase of £185,511 (14.03%); £1,317,183 of expenditure, compared to £1,261,471 in 2016, an increase of £55,712 (4.42%) and an unrealised gain on investments in 2017 of £93,463 compared to £17,254 in 2016, an increase of £76,209 (441.69%).

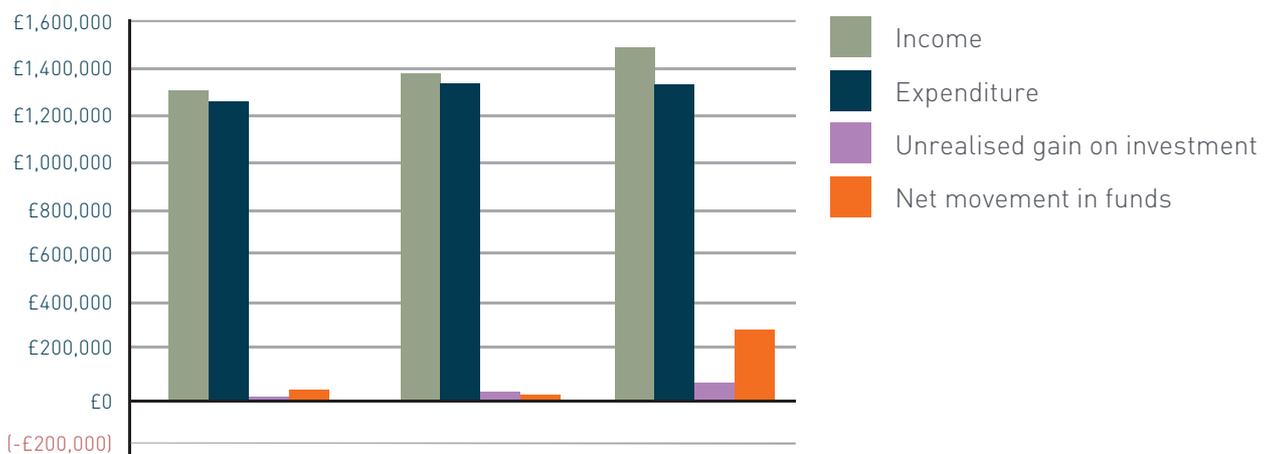
The net increase in the Group's income totalling £185,511 was made up of: an increase in income from journals £110,335; an increase in income from Scientific Meetings £92,940 (there were two more meetings in 2017 than 2016, and more members attended); an increase in Other Non-Charitable income £12,863; an increase in Membership income £4,492 (membership passed 5,000 for the first time in 2017); an increase in Books and Reports income £4,008, offset by a reduction in Professional Standard and Development income £22,823; a reduction in income from Trading Activities £12,467; and a reduction in

income from Investments £3,837.

The increase in the Group's expenditure of £55,712 was made up of: an increase in the expenditure on Scientific Meetings £69,331; an increase in expenditure on Grants, Awards and Bursaries £9,999; an increase in expenditure on Publications £2,568; an increase in the expenditure on raising funds £897, offset by a reduction in expenditure on Professional Standards and Development £27,083.

The Group's cumulative surplus stood at £2,413,842 at 31 December 2017 of which £407,893 is currently financing tangible fixed assets.

The Finance and Business Planning Committee has continued with the development of a long term financial plan to complement the strategy, annual budget and annual business plan. It hopes to conclude this work in 2018.



	2016 Actual	2017 Budget	2017 Actual
Income	£1,321,930	£1,370,978	£1,507,441
Expenditure	£1,261,471	£1,393,082	£1,317,183
Unrealised gain on investment	£17,254	£22,500	£93,463
Net movement in funds	£77,713	£396	£283,721



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 2017. 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 the year we welcomed in a new President, Professor Mark Tooley, who formally took up the post at the Annual General Meeting during the MEIBioeng/MPEC conference at Sandown Park Racecourse in September. We wish him all the best in the role. The following new Trustees were also appointed:

- **Dr Susan Barley**,
Vice President Industry
- **Professor Bernie Conway**,
Member Trustee
- **Dr Robert Farley**,
Director, Professional
and Standards Council
- **Ms Keratiloë Moyo**,
Honorary Secretary

Their appointments followed the end of term of outgoing President Professor David Brettle and the following Trustees: Professor Julie Horrocks, Professor Pete Hoskins, Miss Kimberley Saint, and Professor Paul White.

One of the Institute's roles is to promote the understanding of the impact of physics and engineering in everyday medicine and to that end IPEM continued to support the STEM ambassadors who are working tirelessly to bring this awareness to schools and young people.



The IPEM Board of Trustees

Brexit remained a hot topic of debate and IPEM ensured its voice was heard in standing up for the scientific and engineering community. The Institute provided written evidence to several consultations on the issue throughout the year and also contributed to the Campaign for Science and Engineering's (CaSE) dossier of members' views on scientific regulation in a post-Brexit Britain.

Despite the uncertainty over Brexit, IPEM continued to make and build up strong links on the international stage. To support the International Day of Medical Physics, which in 2017 celebrated women in medical physics to mark the 150th birthday of Marie Curie, the Institute asked women medical physicists across the world to send in their photographs to feature on a poster. More than 150 women from every Continent responded to the call, from Canada to Australia, Chile to India, and all points in between.

At home the Institute has continued to build on the excellent work it has done on promoting the values of equality, diversity and inclusion within the profession, and has worked with other organisations, such as the

Royal Academy for Engineering, on this. During the year, IPEM carried out a comprehensive EDI survey to establish the diversity characteristics of members. In June, Network Mentors were introduced to celebrate and promote diversity and increase the visibility of underrepresented groups.

Finally, it is with regret that we record the deaths of the following members notified during 2017:

- **Professor Roland Blackwell**
- **Dr Mohammad Chaudhri**
- **Dr Peter Francois**
- **Dr John Haybittle**
- **Dr Douglas Mabbs**
- **Mr Stephen Mason**
- **Dr Derek Pearson**
- **Mr Kenneth Russell**
- **Professor Peter Wells CBE**
- **Professor Heinz Wolff**



Keratiloë Moyo

Ms Keratiloë Moyo
Honorary Secretary

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>Dr Neil Lewis, former Director of Medical Engineering and Physics at King's College Hospital in London</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 Lurie, School of Medicine, Medical Sciences & Nutrition, at the University of Aberdeen</p>
<p>Innovation Gold Medal</p> <p>The Innovation Gold Medal is awarded to any member who has a substantial and sustained track record at an outstanding level of contribution to the advancement of healthcare innovation resulting in translation into clinical practice; related to physics and engineering applied to medicine and biology.</p>	<p>David Gow CBE, former Head of SMART Services for NHS Lothian, founder of Touch EMAS Bionics, and inventor of the i-Limb® prosthetic hand</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>Dr Tracy Underwood, research fellow in radiation therapy at University College London</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>Dr Mohammed Atari, Senior Mathematical Modeller at Cyprotex</p>
<p>Roy Ellis Award</p>	<p>Dr Jonathan Ashmore, of the Raigmore Hospital in Inverness, and Dr Cormac McGrath, lead MRI Clinical Scientist for the Northern Ireland Regional Medical Physics Service.</p>

Spiers' Award for Outreach

Elizabeth Kapasa, St James's University Hospital in Leeds

Medical Physics and Engineering Conference Prizes

President's Prize for best oral presentation

Cara Cooper, Dundee Hear Glue Ear: Horizontal Innovation to provide hearing for children with Glue Ear and **Matthew Smith**, Cambridge Biomechanical Analysis of Balloon Eustachian Tuboplasty

Trainee's Prize for best oral presentation by a trainee

Conor MacDonald, University of Dundee Shear Wave Elastography (SWE) and Velocity Vector Imaging (VVI) as predictive markers of arterio-venous fistula outcomes: preliminary results

Poster Prize

Poppy Turner, University of Leicester Development of an ultrasound phantom for investigating brain tissue pulsations generated by the major cerebral arteries

Journal Prizes

The Martin Black Prize for best paper in Physiological Measurement in 2016

Peter H Charlton, Timothy Bonnici, Lionel Tarassenko, David A Clifton, Richard Beale and **Peter J Watkinson**

An assessment of algorithms to estimate respiratory rate from the electrocardiogram and photoplethysmogram

The Jack Perkins Prize for best paper in Medical Engineering and Physics in 2016

Kathrin Müller, Dmitry A Fedosov, and **Gerhard Gompper**

Understanding particle margination in blood flow - A step toward optimized drug delivery systems

The Roberts' Prize for best paper in Physics in Medicine and Biology in 2016

Nathan McDannold, Margaret Livingstone, Can BarıĐ Top, Jonathan Sutton, Nick Todd, and **Natalia Vykhodtseva**

Preclinical evaluation of a low-frequency transcranial MRI-guided focused ultrasound system in a primate model

Scientific meetings

Month / SIG	Date	Title	Venue	Attendees
JANUARY				
IPEM Trainee Network	13th	Trainee Induction and Specialism	York	54
FEBRUARY				
Informatics & Computing	16th	DICOM Teaching for physicists and engineers in medicine	London	61
MARCH				
	10th	Workshop on the assessment of non-laser optical sources	London	20
Diagnostic Radiology	16th	Dental CBCT performance testing for physicists and technologists	Manchester	58
Magnetic Resonance/ Radiotherapy	31st	MR in the planning, delivery and monitoring of radiotherapy	Edinburgh	86
APRIL				
Ultrasound and Non Ionising	4th	The Physics & Technology of Medical Ultrasound	York	36
Radiotherapy	25th	Superficial radiotherapy: treatment of the future?	Birmingham	64
Clinical Engineering	26th	Role of clinical engineering in medical device research, design and health technology assessment	Birmingham	37
MAY				
	11th	Clinical technologist training scheme: Induction day	York	16
	18-19th	Heads of Radiotherapy Physics	Sheffield	59
Radiation Protection	24th	RPA Update	Bristol	143
Radiation Protection	25th	RPA Update	Bristol	113
JUNE				
Regional	9th	South West Regional Scientific Meeting	Gloucester	51
Ultrasound and Non Ionising	23rd	Implementing the EMF Regulations and their relevance to Healthcare	London	33
	27-29th	Mammography Physics Training Meeting	Birmingham	99
	29th	PET Update: Current status and future developments	York	35
JULY				
Diagnostic Radiology	11th	Practical approaches to optimisation in diagnostic radiology	Peterborough	46
SEPTEMBER				
MPEC 2017	13-14th	MEIBioeng / MPEC 2017	Sandown Park	208

Month / SIG	Date	Title	Venue	Attendees
	19th	Training day for supervisors and moderators of clinical technologists training scheme	Glasgow	28
Physiological Measurement	29th	Developments in microvascular imaging	York	13
OCTOBER				
Nuclear Medicine/ Radiation Protection	3rd	Radiation Protection in Nuclear Medicine	Birmingham	92
Diagnostic Radiology	4th	Dose management in contemporary radiological practice	Birmingham	63
NOVEMBER				
Radiotherapy	7th	New developments in radiotherapy quality assurance	Newcastle	86
Magnetic Resonance	14th	MR Safety Update	York	108
	21st	Clinical technologist training scheme: Induction day	York	15
DECEMBER				
Informatics & Computing	12th	Annual clinical and scientific computing symposium	Manchester	53



Prof David Brettles with VR headset at Sandown Park

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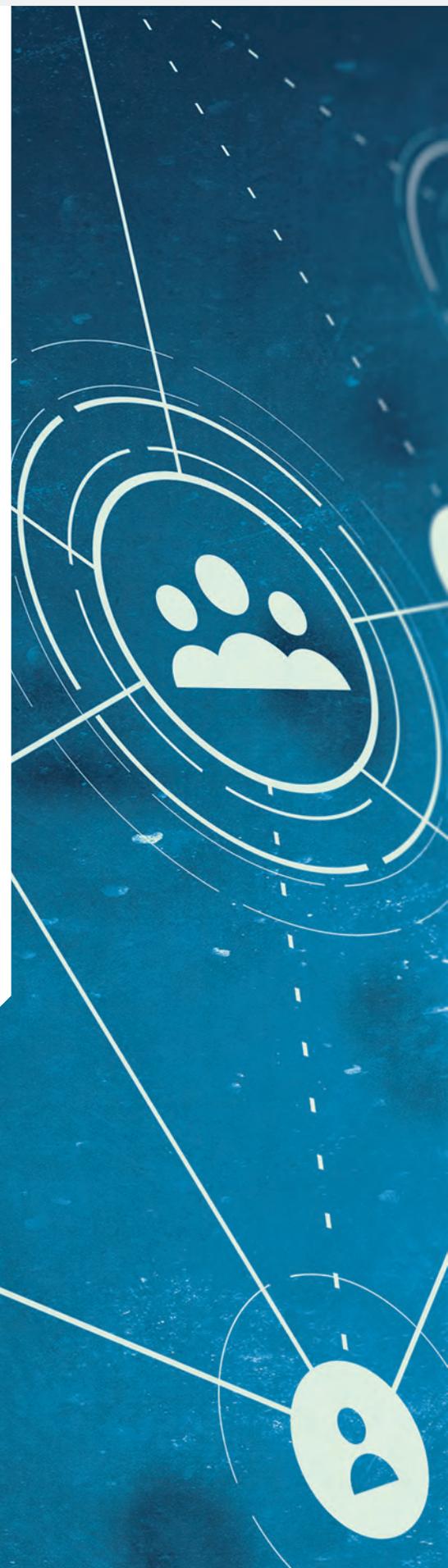
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 EFOMP
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 SRP International Committee
 IUPESM
 IUPESM
 EAMBES
 EAMBES
 IFMBE
 IOMP



Views from the membership survey

“ In terms of IPEM organised conferences - it would be great if there was an option to remotely attend these meetings ”

“ It would be good to see IPEM having a more international flavour ”

“ I'm proud to be a member of IPEM and HCPC. They are reference points, providing professional standards and guidance ”

“ I personally believe that IPEM is doing very good job ”

“ Be a counterforce against the growing scepticism towards science and alternative facts ”

“ There needs to be more focus on the IPEM driving innovation ”

“ I think that the values are really important - particularly the one about openness ”

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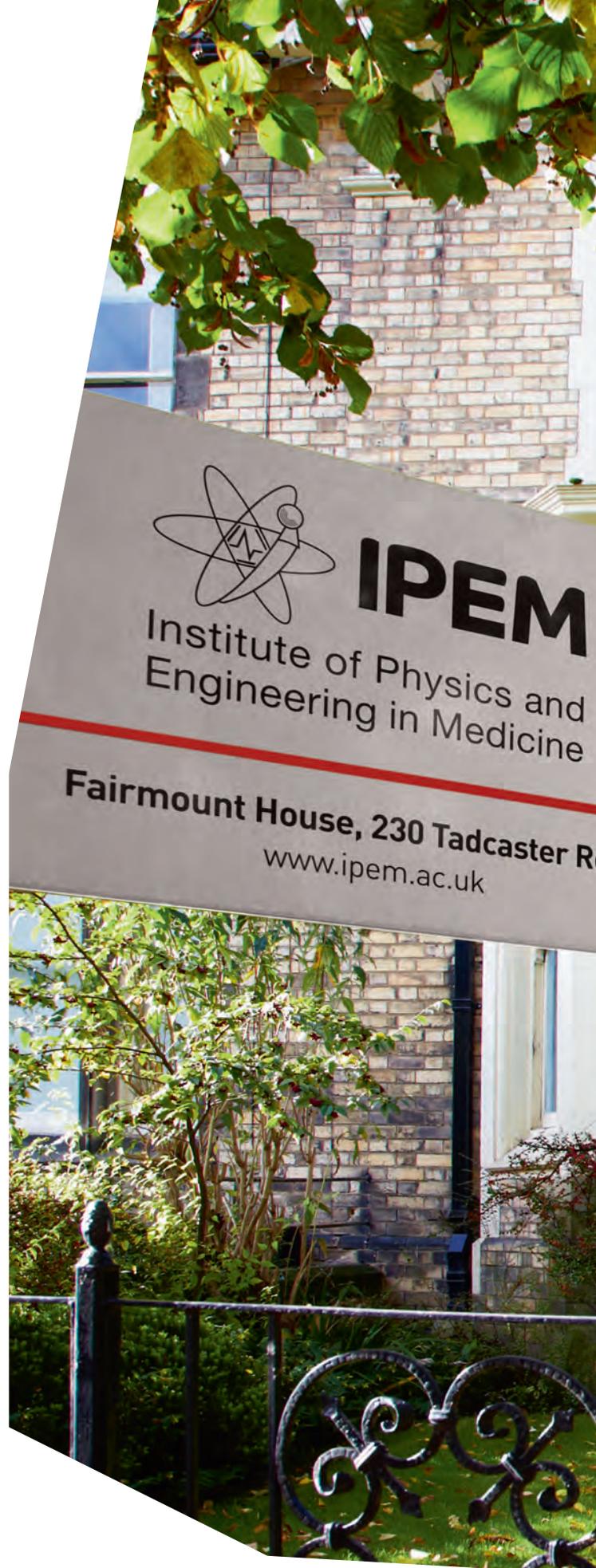
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Adam Hyett Workforce Intelligence Administrator

Nicola Parkinson Finance Officer

Sandra Wilkinson Finance Assistant

*as of May 2018





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