

ANNUAL REVIEW 2018



IPEM Institute of Physics and
Engineering in Medicine



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President's Report

2018 was a busy year for IPEM and we have moved forward in all areas of our strategy and continued to deliver on our charitable objectives.

We were pleased to host the first Peter Wells Memorial Lecture in honour of our first President who passed away in 2017. It was given by Professor Alison Noble from Oxford University, a close friend of Peter's. Her work is in Peter's area of interest, ultrasound, and her lecture was on ultrasound and Artificial Intelligence (AI) in imaging. AI in medicine has great national interest and the topic is now on our science strategy as we intend to be very involved in this area.

The World Congress on Medical Physics and Biomedical Engineering was held in Prague, and IPEM was well represented there. It was encouraging that we are well known and well respected in the work we do. Our organisation is unique in the world, in that we represent both medical physics and biomedical engineering. I attended the assemblies of the International Organization for Medical Physics and the International Federation for Medical Engineering and Biology. The overall umbrella organisation representing both is the International Union of Physical and Engineering Sciences in Medicine, and almost 50 per cent of its ruling council is made up of IPEM members.

Our members gained huge success at the Chief Scientific Officer's awards and the year was also designated the Year of Engineering. You can read more on them later in the review.

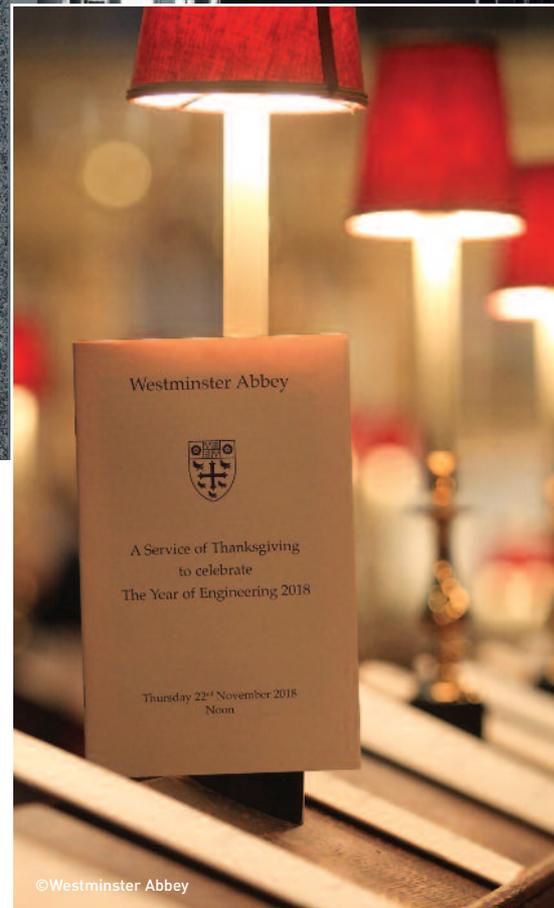
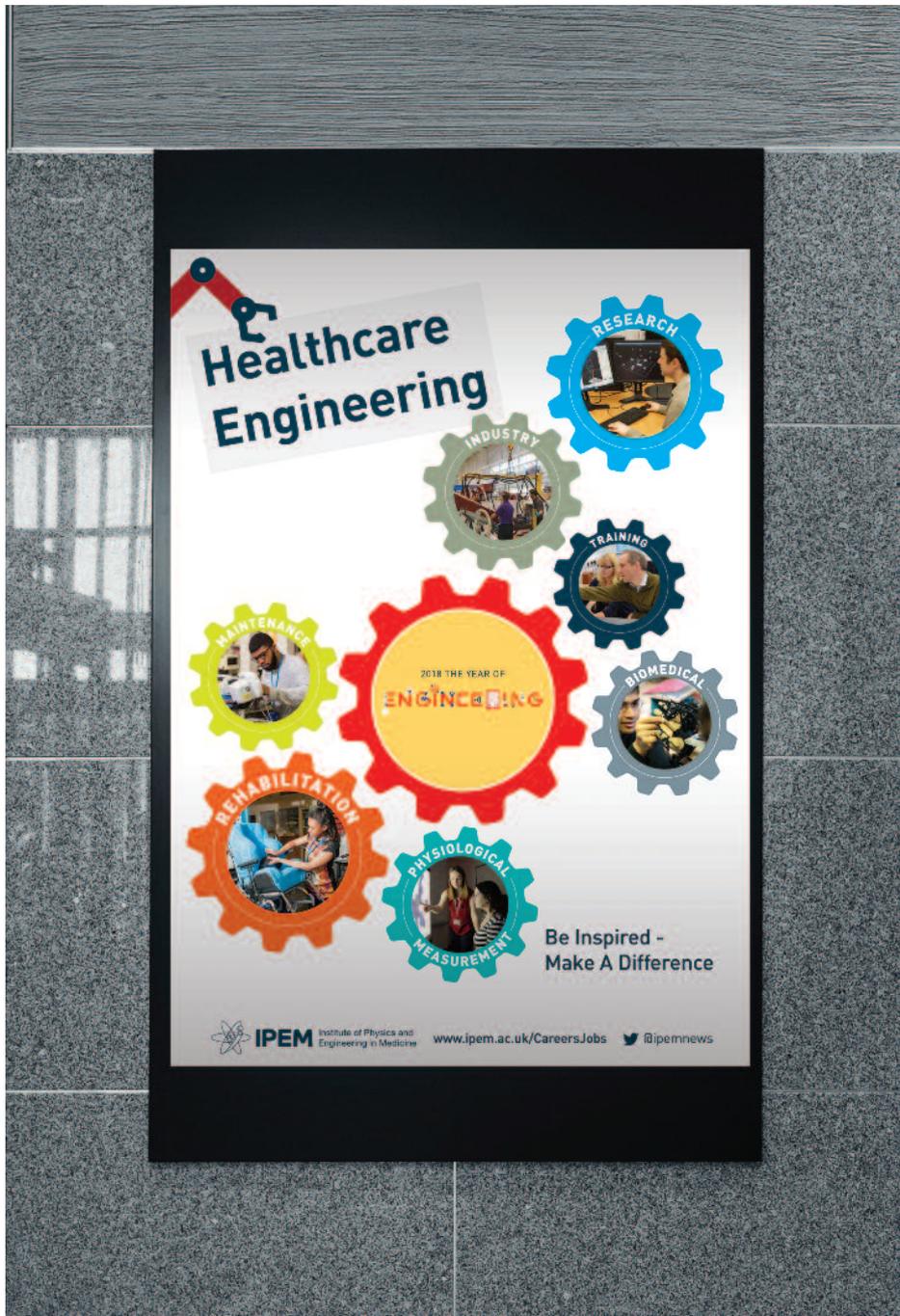
Our annual Medical Physics and Engineering Conference was held in York. A special members' charity concert was held to celebrate the NHS at 70 and to raise money for our Little Linac project. You can read more on these later in the review. The conference also launched the new board and committee structures, which had been finalised earlier in the year.

I would like to thank all members for their continued enthusiasm and contribution to IPEM's activities. The Institute is our members and so much is owed to those who are active in the organisation. I would like to thank the National Office, led by Rosemary Cook, for their fantastic efforts and helping to make IPEM such a successful, solvent and well-respected organisation.



Professor Mark Tooley FREng.
President





Year of Engineering

The Year of Engineering was a government campaign to celebrate the world and wonder of engineering. IPEM marked it by having a special poster designed for the healthcare engineering community.

Several IPEM members attended a special service at Westminster Abbey to mark the Year of Engineering. This was held to celebrate the outstanding contribution that engineers past and present have made to society and to inspire the next generation of budding engineers.

The Little Linac

In 2018, the Little Linac project was launched. The brainchild of Professor David Brettle when he was IPEM President, the aim is simple: To give every child in the UK undergoing radiotherapy treatment for cancer a free kit of model play bricks to build a model linac to help ease their stress and anxiety.

IPEM brought three partners on board – the British Institute of Radiology, the Royal College of Radiologists and the Society and College of Radiographers – to ensure all the professionals involved in children’s cancer treatment knew about the Little Linac.

By the end of the year, 1,600 Little Linac kits had been donated to the 16 paediatric radiotherapy centres across the UK. Almost 640 Little Linac kits had been sold, with orders from as far afield as Australia, New Zealand, the USA, Mexico and Peru. Those sales meant nearly 1,300 kits were donated to children undergoing radiotherapy treatment.

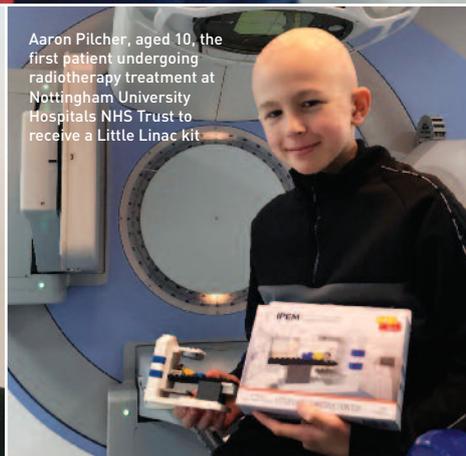
Read more about the Little Linac by visiting www.tinyurl.com/LittleLinac



Oliver Chillmaid, aged four, one of the first children to receive a Little Linac kit, at the Northern Centre for Cancer Care in Newcastle



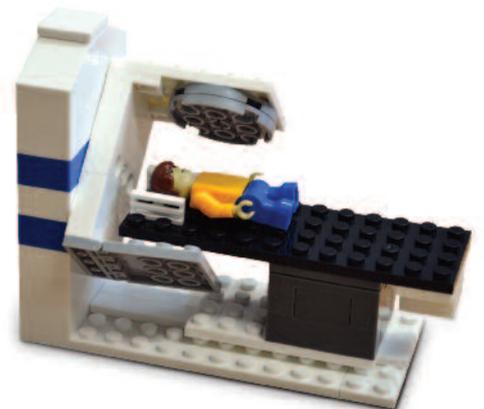
David Brettle and Little Linac



Aaron Pilcher, aged 10, the first patient undergoing radiotherapy treatment at Nottingham University Hospitals NHS Trust to receive a Little Linac Kit



L-R at NHS Greater Glasgow and Clyde: Jill Scott, Superintendent Radiographer, Bronwyn aged 7, and Maureen Houston, Senior Play Therapist



The IPEM charity concert

A charity concert was held at the National Centre for Early Music in York on the opening night of the MPEC conference to celebrate 70 years of science in the NHS and to raise money for the Little Linac project.

All but a handful of the performers were IPEM members and the evening was graced by special guests the Lord Mayor and Lady Mayoress of York and Fiona Carragher, Deputy Chief Scientific Officer for England. She spoke about the importance of science in the NHS and what a crucial role medical physicists and clinical engineers play in modern healthcare.

Several of IPEM's corporate members sponsored the concert and more than £500 was raised for the Little Linac project.

Comments from the audience included:

"I have been involved with IPEM and its predecessor organisations in one way or another for 30 years, and the concert was one of the most remarkable IPEM events I have attended in all that time."

"A delightfully varied programme performed by stunningly talented performers. Seems unfair to single out anyone specifically, but IPEM Voices deserves a special mention – coming together as a choir without opportunity to rehearse together is a risky strategy but they were amazing!"

"I expected the standards of the performances to be high, but even with that expectation in mind, I was surprised at how very high the standards were on the night. It was an absolutely excellent evening."

"Who knew there was so much talent within the medical physics/engineering professions!"



Mark Tooley



Lydia Westhead



Anna Gardiner



Mike Kirby conducting



Richard Caley



Rachel Bidder



Rob Farley



John Mills



IPeM Voices

International

IPEM attends international conferences to engage with national and international bodies to support their activities and share the Institute's experiences and skills.

In 2018 IPEM attended the World Congress on Medical Physics and Biomedical Engineering in Prague in the Czech Republic, the second European Congress of Medical Physics in Copenhagen, Denmark, and had representation at the 18th Asia-Oceania Congress of Medical Physics & the 16th South-East Asia Congress of Medical Physics in Kuala Lumpur, Malaysia, where there was an IPEM symposium.

A newsletter aimed at international members was launched during the year and a new international page on the website was created.

Professor Daniel Clark, Head of Clinical Engineering at Nottingham University Hospitals NHS Trust, took up the reins as IPEM's new Vice President International. He is taking forward the international strategy and looking at opportunities to promote IPEM abroad.

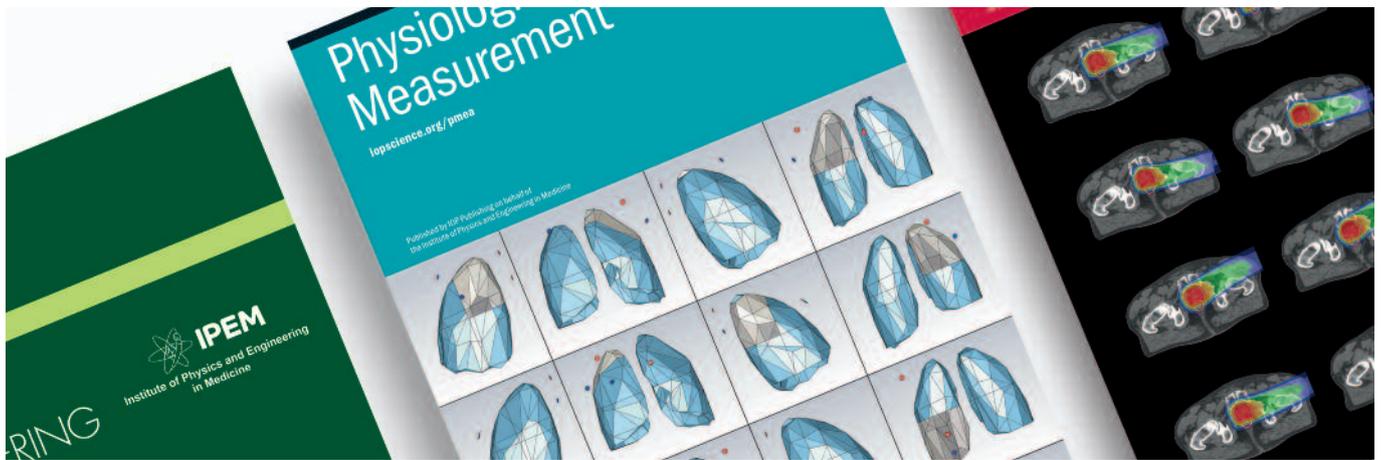
Some 55 years after the International Organization for Medical Physics was formed as an un-incorporated organisation, in 2018 IOMP officially became a Private Company Limited by Guarantee, with its registered address at the IPEM offices in York.



Vice President International
Daniel Clark



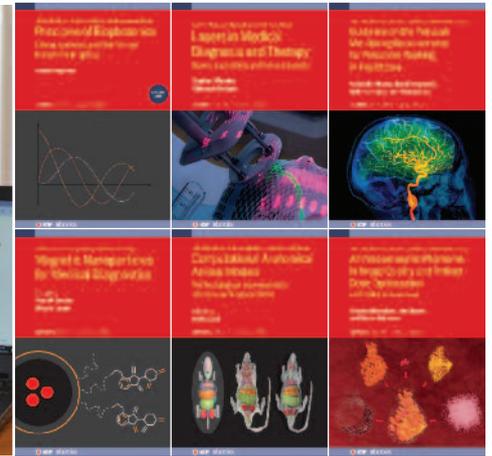
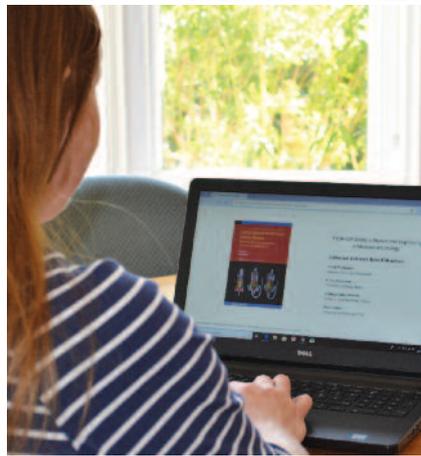
Professor Slavik Tabakov, IOMP President (left),
and Professor Mark Tooley, IPEM President



Medical Engineering & Physics

Published by: Elsevier
 Submissions: 737
 Publications: 123
 Issues: 12
 Impact Factor: 1.923 (2017)
 Downloads: 350,269

Ranking:
 44 out of 78 titles in the Engineering, Biomedical category
 55/83 (Q3) Physiology



Physics in Medicine & Biology

Published by: IOPP
 Submissions: 1,499
 Publications: 655
 Issues: 24
 Impact Factor: 2.665
 Downloads: 983,357

Ranking:
 42/129 (Q2) Radiology, Nuclear Medicine & Medical Imaging
 27/78 (Q2) Engineering, Biomedical

Physiological Measurement

Published by: IOPP
 Submissions: 550
 Publications: 229
 Issues: 12
 Impact Factor: 2.006
 Downloads: 290,082

Ranking:
 45/72 (Q3) Biophysics
 39/78 (Q2) Engineering, Biomedical
 55/83 (Q3) Physiology

International journals and ebooks

The official launch of IPeM's new ebook programme with publishers IOPP took place in 2018. A total of six ebooks were published during the year and authors were signed up to provide a further 17 ebooks during 2019 and 2020.

It was another good year for Physics in Medicine and Biology, which saw a slight growth in the number of submissions received and an increase in the number of accepted articles. The letters programme continued to show a lot of promise, with more submissions than ever before. During the year, the peer review resource was launched, a dedicated set of educational videos from the PMB board itself in addition to a refereeing template.

It was a ground-breaking year for Physiological Measurement for articles submitted to the programme of Focus collections. This in turn resulted in more

accepted articles than any of the previous five years. Another first during 2018 was the debut of a PM webinar.

Medical Engineering & Physics continued to provide a forum for the publication of the latest developments in biomedical engineering and reflects the essential multidisciplinary nature of the subject. MEP's focus encompasses the application of the basic principles of physics and engineering to the development of medical devices and technology, with the ultimate aim of producing improvements in the quality of health care.



Big Bang Fair girl with ultrasound

Outreach and public engagement

We supported around 90 outreach and public engagement events which were held across the UK involving IPEM member volunteers, everything from hospital open days to school visits and science fairs.

Once again, IPEM had a stand at the Big Bang Fair, meeting and engaging with thousands of young people at the NEC in Birmingham.

Several public lectures were held across the year. These included the inaugural Peter Wells Memorial Lecture in London, given by Professor Alison Noble, Professor of Biomedical Engineering, University of Oxford, and a talk at the York Festival of Ideas by IPEM member Dr Cormac McGrath on a 'Child's Eye Virtual Reality View of a Hospital Visit' with his daughter Aoibhinn (the voice of the child on the VR app).

The latest in 'The Science & The Scientists' leaflet and poster series was published, on physiological measurement.

Our Public Engagement Panel members were involved in a wide range of the Institute's work, including the Clinical Imaging Board's leaflet and poster project, the Medical Physics and Clinical Engineering accreditation programme, advising on the 'The Science & The Scientists' physiological measurement leaflet, and judging two IPEM awards. The PEP also held a very engaging and successful interactive session at MPEC.



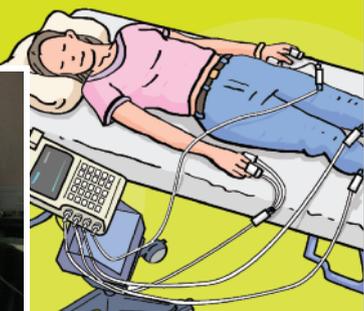


IPEM

The Science & The Scientists

Assessing the body with physiological measurement

Physiological measurement is the science of transforming physiological information into meaningful data to contribute to diagnosis or treatment.





Big Bang Fair girl with VR headset



York Festival of Ideas Dr Cormac McGrath and daughter Aoi bhinn

Supported 130 members on national, European and international standards groups



293

Fellows

1208

Associate Members

1414

Affiliate Members

2318

Full Members

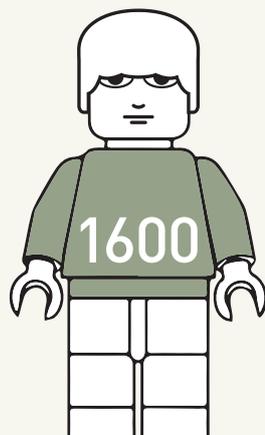
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Professional Affiliate Members

494

New members overall in 2018

Launched
the Little
Linac
campaign



1600 Little Linac kits were donated to the **16** paediatric radiotherapy centres across the UK.

A total of **636** Little Linac kits were sold, with orders from as far afield as Australia, New Zealand, the USA, Mexico and Peru.



Published **6** new scientific reports through the international ebooks programme to help members maintain high standards of practice.

Launched our new ebooks series



Delivered
90
outreach and public engagement events.

Organised
25 scientific meetings and events, with **1392** attendees.

Contributed to
29 government and other policy consultations or meetings across the UK.

Invested £50,000 in innovation projects to improve care

1.62 million downloads from IPEM journals.



Handed out **£67,852** to members in prizes, grants and awards in 2018.

Prizes, grants and awards

IPEM handed out £67,852 in prizes, grants and awards in 2018 as follows:

- Grants and awards totalling £60,927
- Prizes totalling £6,925

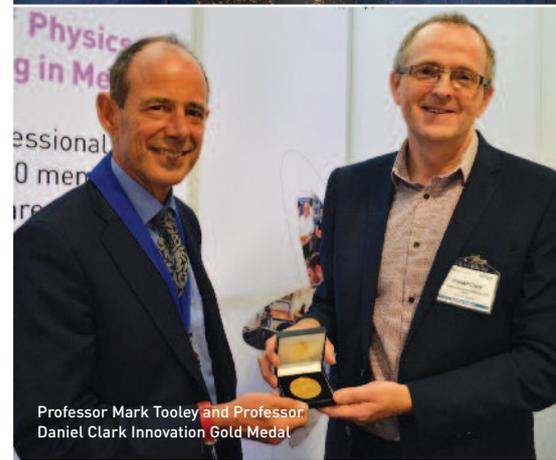
Gold Medal awards were presented at the MPEC conference in York to members who had made outstanding contributions in their area of work. Recipients included Dr Colin Martin, awarded the Healthcare Gold Medal, and Professor Daniel Clark, who was awarded the Innovation Gold Medal. For a full list of Gold Medal winners, including other award recipients and the journal prize winners, see the Prizes and Awards section of our website.

Members once again swept the board at the prestigious Chief Scientific Officer awards. For the third year running an IPEM member was named the Healthcare Scientist of the Year as Dr Ranald Mackay, a Fellow and Director of Medical Physics and Clinical Engineering at the Christie NHS Foundation Trust in Manchester, picked up the top award for his work on bringing proton beam therapy to the NHS. Other members who won awards were:

- Professor Paul White, a Fellow, won the Excellence in Research award.
- Dr Keith Ison OBE, a Fellow and former IPEM President, was presented with a Lifetime Achievement Award.
- Dr Jonathan Ashmore and Dr Cormac McGrath won the Innovation in Healthcare Delivery award for the virtual reality app they developed to help children who are scared and anxious about having an MRI scan.
- Dr Keith Langmack, a Fellow, won the Equality and Diversity in Leadership award.
- Professor Daniel Clark was presented with the Developing Partnerships to Improve Outcomes award.



Professor Mark Tooley and Dr Colin Martin Healthcare Gold Medal

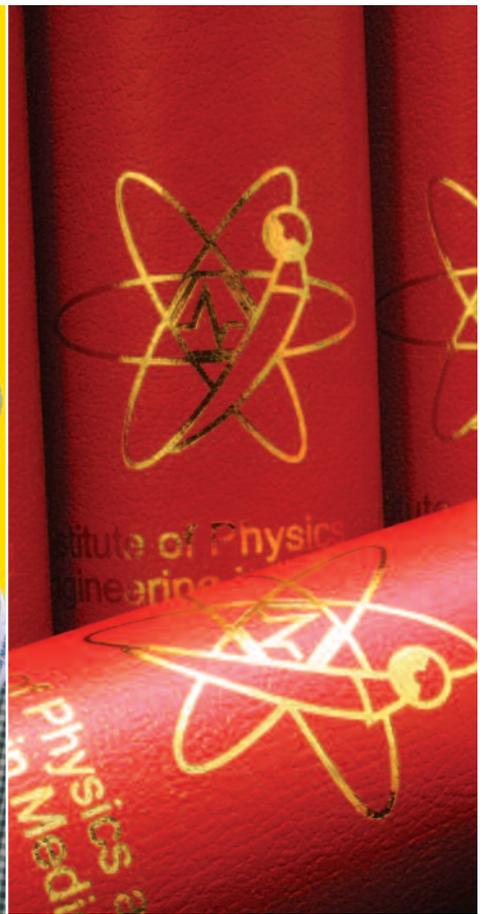


Professor Mark Tooley and Professor Daniel Clark Innovation Gold Medal

Elsewhere, Dr Roger Staff, a Fellow and Director of the Science, Research and Innovation Council, was awarded the Norman Veall Medal by the British Nuclear Medicine Society for his outstanding contribution to nuclear medicine.



Dr Roger Staff winner of the Norman Veall Medal



Dr Cormac McGrath and Dr Jonathan Ashmore who won the Chief Scientific Officer's Innovation in Healthcare award

Innovation Grant recipients 2018

Name: Miss Maighread Ireland

Design and Innovation Engineer
Clinical Engineering Innovation
Cambridge University Hospital
NHS Trust

Project Title:

Magrow - An Implantable Cranio-
Maxillo-Facial Distractor.

Amount: £6,042

Name: Dr David Keane

Clinical Scientist
Department of Renal Medicine
St James's Hospital, Leeds

Project Title:

Can the use of non-invasive
haemodynamic monitoring help to
individualise fluid removal during
haemodialysis?

Amount: £6,270

Name: Mr Mark Reeves

Clinical Scientist
Department of Medical Physics
and Clinical Engineering
Sheffield Teaching Hospitals
NHS Foundation Trust

Project Title:

Project to extend the clinical utility
and user acceptability of a novel
rehabilitation intervention through
the optimisation of electrode design.

Amount: £9,199

Name: Dr Ruth Tuura

MR Centre
University Children's Hospital
Zurich
Switzerland

Project Title:

Further develop a software
interface that supports pre-surgical
targeting for MRgFUS or other
functional neurosurgical methods.

Amount: £9,236

Name: Dr Prashant Verma

Clinical Scientist
Department of Medical Physics
and Clinical Engineering
Sheffield Teaching Hospitals NHS
Foundation Trust

Project Title:

Modelling the 3D in-air
reverberation pattern from Medical
Ultrasound Transducers.

Amount: £10,000

Name: Professor Carmel Moran

Professor of Translational Ultrasound
Queen's Medical Research Institute
University of Edinburgh

Project Title:

Development of a test object for the
objective assessment and quantification
of elastography modules on commercial
ultrasound scanners.

Amount: £10,000

Policy and consultation

Individual members, and those who sit on IPEM's various Special Interest Groups and committees, together with the Institute's officers, contribute to a wealth of policy matters, consultations and working parties on a wide range of topics. The following gives a flavour of the areas IPEM was involved in throughout the year.

Brexit

Members and officers of IPEM:

Attended a special Brexit summit organised by the House of Commons Science and Technology Committee.

Provided input to a meeting of the Campaign for Science and Engineering (CaSE), of which IPEM is a member, to share insight and identify shared messages and goals for the Brexit negotiations.

Responded to the House of Commons Health Select Committee inquiry concerning the regulatory arrangements needed to guarantee the safe and effective supply of medicines, medical devices and products once the UK leaves the EU.

Issued a statement to reaffirm the Institute's commitment to its members, regardless of where they lived, and aimed to promote awareness and application of professional standards and CPD regardless of EU membership. The statement added that IPEM would retain a close working relationship with European organisations through participation in relevant groups and networks within the EU.

Parliamentary matters

IPEM supported the formation of an All-Party Parliamentary Group for Radiotherapy (APPGRT), which aims to be the voice in Parliament of cancer patients, their families and of those who work within the radiotherapy field. The APPGRT launched a cross-party manifesto calling for increased investment in radiotherapy provision.

The Institute co-sponsored an All-Party Parliamentary Group on Diversity and Inclusion in STEM, which aims to promote the inclusion and progression of people from diverse backgrounds.



APPGRT launch with Tim Farron MP Chair of the APPGRT (centre) and IPEM member Dr Vivian Cosgrove (right)

Policy and position statements

Three new policy and position statements were issued during the year and another one was reviewed and updated. See the website under Scientific Journals & Publications / IPEM Statements and Notices for the complete list.

Ionising Radiation (Medical Exposure) Regulations

IPEM was closely involved with the consultation and feedback processes during the period leading up to the implementation of the revision of Ionising Radiation Regulations 2017 and the Ionising Radiation (Medical Exposure) Regulations 2018.

IPEM led on the production of a collaborative response to the Ionising Radiation Regulations 2017 consultation, representing medical sector views, together with the Royal College of Radiologists, the British Institute of Radiology and the Society and College of Radiographers.



Medical Physics Experts

Work continued on the recognition of Medical Physics Experts under the new Ionising Radiation (Medical Exposures) Regulations and a joint proposal from IPEM, RPA 2000, the Association of University Radiation Protection Officers and the Society for Radiological Protection was submitted to the Department of Health & Social Care.

The Institute's radiation protection expert/medical physics expert (RPE/MPE) task group produced guidance on completing the Department of Health & Social Care MPE recognition scheme to help members comply with the requirements of applying to be recognised as an IR(ME)R 2000 MPE.

Other areas

Members of the Radiotherapy Special Interest Group and the Radiotherapy Professional Standards Group contributed to Health Education England's 'Cancer Workforce Plan Phase 1: Delivering the cancer strategy to 2021' call for evidence.

IPEM's Science, Research and Innovation Council (SRIC) submitted a contribution to the Royal College of Surgeons 'Commission on the Future of Surgery'. IPEM also lobbied to have a medical physicist or clinical engineer representative on the Commission.

Members of the Diagnostic Radiology Special Interest Group remained active participants on Public Health England's dose audit working party, looking at the future provision of national dose audit for x-ray examinations.

The Professional and Standards Council (PSC) responded to a Health Education England consultation on 'Facing the Facts, Shaping the Future', a draft health and care workforce strategy for England for the next decade.

IPEM Fellow Mark Knight, as Director of SRIC, wrote to the Health and Safety Executive on behalf of the Institute to request the addition of Gallium-67 values to Table 1 of Schedule 7 of the Ionising Radiation Regulations 2017. The HSE agreed to do this.

IPEM began work with the National School for Healthcare Science to set up a trailblazer group for a broad Level 7 Apprenticeship Standard in Healthcare Science that will encompass medical physics and engineering.

The Workforce Intelligence Unit carried out two surveys: Diagnostic Radiology and Radiation Protection.



Scientific meetings

In 2018, IPEM organised a total of 25 scientific meetings across the country. Almost 1,400 people attended these various workshops and conferences. Some highlights of these included:

The first **MPE Update**, held in London, was a huge success.

“The conference was great in getting all of the medical physics community together for this important change to our profession. I was very impressed with the level of knowledge of the speakers and the amount of effort they’d put in to get us to this stage.”

The Diagnostic Radiology Special Interest Group held an interactive **Ethics and Research Using Ionising Radiation Workshop** in York.

“A very well-balanced programme. All DR speakers excellent. Some useful tips provided. RT presentation especially insightful to me as a non-specialist. Industry talks also excellent from the Big Pharma reps.”

The Rehabilitation and Biomechanics Engineering Special Interest Group held an event on **Wheelchair Stability & Tuning** in York.

“Great opportunity to network and to become updated on the latest thinking in this field of work.”

MPEC was held at York Racecourse across three days and included the popular free Members’ Day. The theme was Celebrating 70 years of Scientific Collaboration to mark the NHS at 70 and the relationship between the NHS, industry and academia.

The Woolmer Lecture at MPEC was given by Professor Alison Noble, from the Institute of Biomedical Engineering at the University of Oxford.

The Keynote Session was on innovation, with speakers covering the topic of innovation from university to industry and how NHS innovation can be turned into reality.





Prof Alison Noble receives her Woolmer Lecture certificate from Prof Mark Tooley



Honorary Treasurer's Report

The outturn for 2018 was an operating surplus of £207,169. This was achieved against the original plan of a balanced budget.

The net surplus for the Group in 2018 is £207,169, compared to a net surplus in 2017 of £283,721, a decrease of £76,552 (26.98%). This consists of a net surplus in 2018 on Unrestricted Funds of £191,824 (2017 net surplus of £278,521) and a net profit in 2018 of £15,345 (2017 net profit of £5,200) on Restricted Funds. The net surplus for the Group in 2018 consists of £1,470,308 of income, compared to £1,507,441 in 2017, a reduction of £37,133 (2.46%); £1,268,365 of expenditure, compared to £1,317,183 in 2017, a reduction of £48,818 (3.71%) and an unrealised gain on investments in 2018 of £5,226 compared to £93,463 in 2017, a reduction of £88,237 (94.41%). The Group's cumulative surplus stood at £2,621,011 at 31 December 2018 of which £420,473 is currently financing tangible fixed assets.

The Finance and Business Planning Committee have been working on a plan to address the risks from the changing environment for several years. This plan includes achieving a balanced budget each year, investing our surplus funds, creating a five-year forecast of income and

expenditure, and setting aside funding for a business development resource to assist IPEM with finding ways to diversify its income generation.

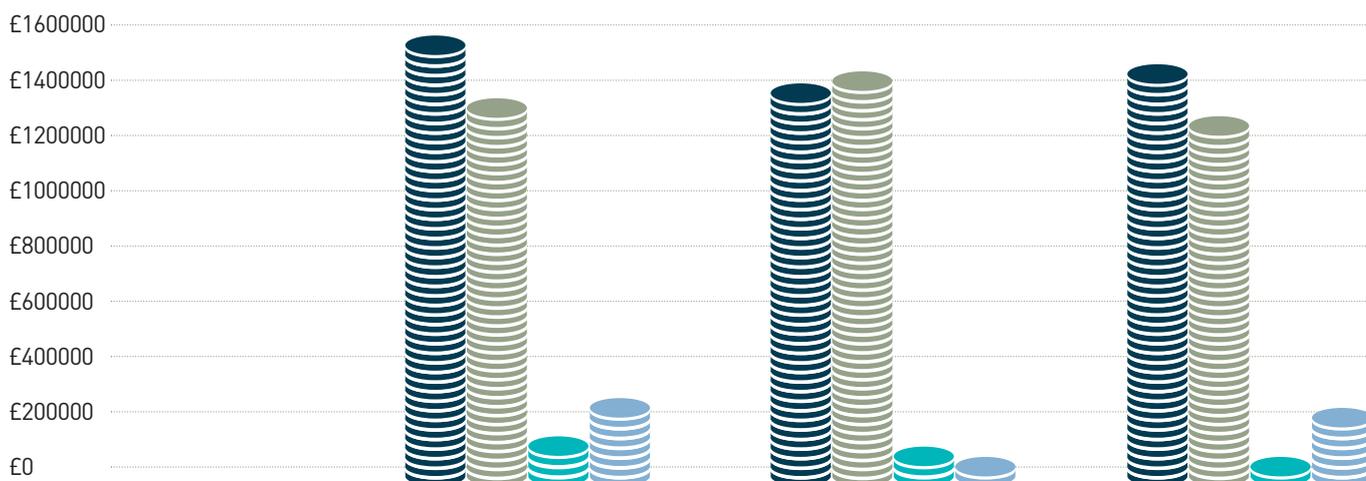
The risk to IPEM's long-term Journals income, which is 50% of IPEM's total income, has increased significantly this year as a result of international developments on Open Access publishing. This risk to Journals income, although on the risk register for several years, has become a high risk in 2018. We are actively seeking more information on this risk, collaborating with other Learned Societies' publishers to find the best way forward, and considering whether we need to create a Gold Open Access journal alongside our current journals.

David Ellis

David Ellis
Honorary Treasurer

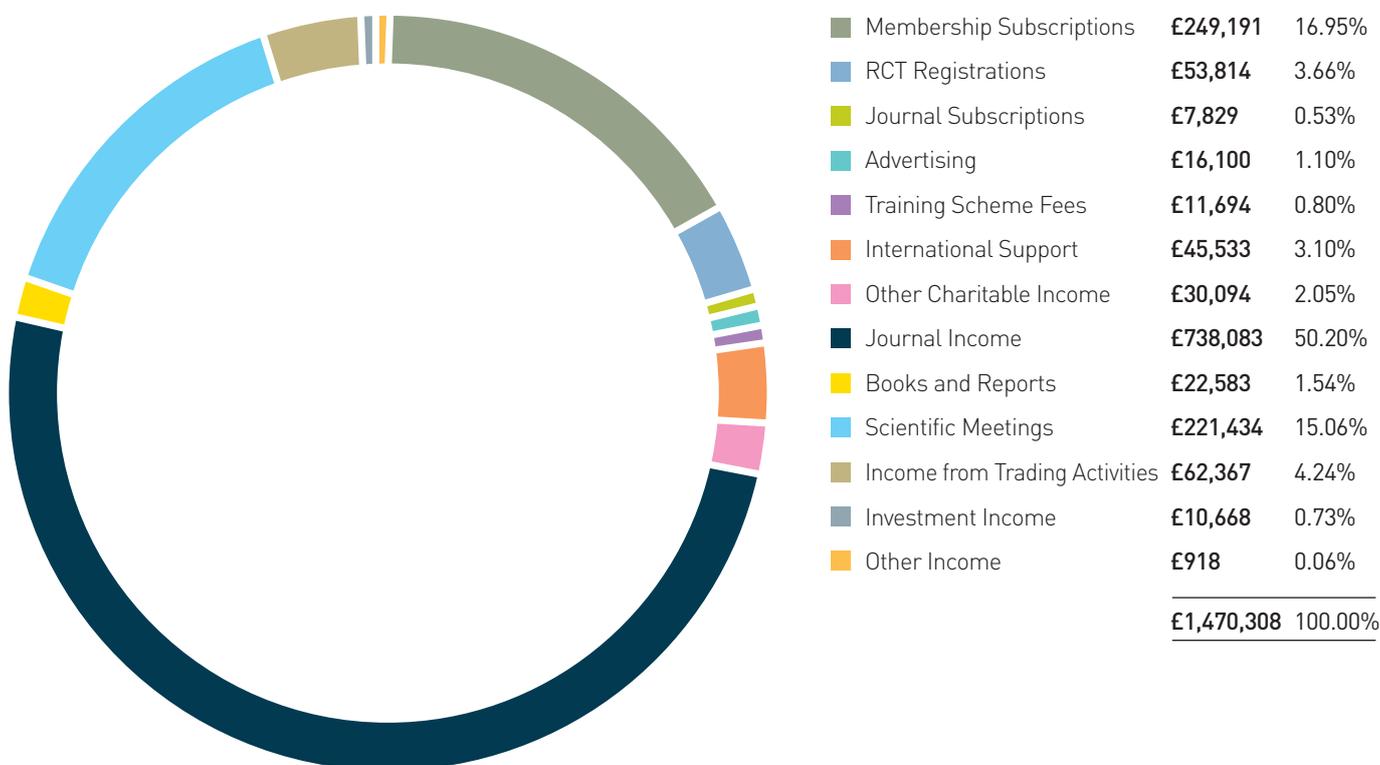


Consolidated Statement of Financial Activity 2018



	2017 Actual	2018 Budget	2018 Actual
Income	£1,507,441	£1,388,258	£1,470,308
Expenditure	£1,317,183	£1,409,760	£1,268,365
Unrealised gain on investments	£93,463	£22,500	£5,226
Net movement in funds	£283,721	£998	£207,169

IPEM Consolidated Income 2018



Honorary Secretary's Report

The IPEM Board of Trustees, whose members are also Directors of the Company, met quarterly during 2018. 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 2018, the Board approved and implemented a series of governance changes aimed at streamlining IPEM's committee structure to support delivery of its strategic objectives and to make best use of the valuable time of its member volunteers. This resulted in a structure with fewer committees and improved flexibility through the use of task and finish groups, online forums and teleconferencing.

The changes also reduced the size of the Board from 17 to 12 members, in line with the recommendations of the Charity Commission's Charity Governance Code. Seven Board members are IPEM members, and five are independent trustees, who bring different skills and perspectives.

The term of office of the President was also amended so that he or she will serve for one year (not two) as President Elect before taking on the two-year presidency, and then serve one term as Past President. One of the aims of the changes was to reduce the burden on the President, and to help with this, a new President's Advisory Committee has been created, comprising the six Vice Presidents and the two Council Directors. The President's Advisory Committee enables the Vice Presidents to highlight important issues in their areas of work and members of this Committee also assist the President in representing IPEM at external meetings and events.

The Board is pleased to see that these changes, introduced following the AGM in September 2018, already seem to be working well.

New members of the Board of Trustees from September 2018 were:

- Stephen O'Connor, President Elect
- Anna Barnes, Member Trustee
- Justin Richards, Independent Trustee (from July 2018)
- Roger Staff, Director of Science, Research and Innovation Council
- Danielle Ross, Independent Honorary Secretary (from November 2018)

As always, IPEM relies heavily on members' activities on committees, Special Interest Groups and working groups to achieve its charitable objectives. We are very grateful to them all for giving their time and expertise. For the first time, the list of these contributing members is now hosted on the IPEM website rather than in the Annual Review: you can see it at www.ipem.ac.uk/Members/CommitteesGroups.aspx

Danielle Ross

Danielle Ross
Honorary Secretary

In Memoriam

During 2018, the Institute recorded with regret the deaths of the following members, notified during the year:

- Miss Holly Batchelor
 - Professor William Mapleson
 - Mr David Rowan
 - Miss Joanne Taylor
-





Staff at the IPEM National Office*

Rosemary Cook CBE
Chief Executive Officer

Kathryn Surtees
Head of Operations and Finance

Marie Goodall
Executive Assistant

Kelly Dade
Office Administrator

Eva McClean
Communications and
Development Manager

Sean Edmunds
External Relations Manager

Candi Colbourn
Conferences Manager

Vacant
Conference Services Administrator

Fiona McKeown
External and International
Services Manager

Sally Hawking
External and International
Services Manager

Jo Pearson
Membership and Training Manager

Vacant
Member Services Officer

Anna Glavocih
Membership Services Administrator

Elaine Gears
Membership Services Administrator

Jemimah Eve
Workforce Intelligence Manager

Adam Hyett
Workforce Intelligence Administrator

Nicola Parkinson
Finance Officer

Sandra Wilkinson
Finance Assistant

*as of April 2019

Big Bang Fair boy with VR headset



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Engineering in Medicine

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