



IPEM Institute of Physics and
Engineering in Medicine

Annual Review 2019





Rosemary Cook CBE, IPEM's former Chief Executive Officer who retired in August, with one of IPEM's campaign posters to celebrate women in medical physics.

Contents

Presidents' Report	03
Outreach and public engagement	04
Prizes, grants and awards	06
Scientific meetings	08
International journals and ebooks	12
International	13
Campaigns	14
Policy and consultation	15
Honorary Treasurer's Report 2019	16
Honorary Secretary's Report 2019	18
Staff at the IPEM National Office	19

Presidents' Report

IPEM has had a very busy but successful 2019. We have moved forward in all areas of our strategy and continued to deliver on our charitable objectives. We have remained in excellent financial health through the careful work of our Head of Finance and Honorary Treasurer. We have built on the implementation of our governance review, introduced in 2018. This made a smaller, more efficient Board of Trustees, a revised and reduced committee structure as well as the introduction of the Communities of Interest networks.



Professor Stephen O'Connor

Professor Mark Tooley

There has been much discussion and activity in the area of artificial intelligence, AI, and medicine, both with government, industry and academia. IPEM has been strongly engaged in this process, through involvement in workshops and discussions. Furthermore, we have established lectures in this area. Our inaugural Peter Wells Memorial Lecture in 2018 was on ultrasound and AI. In 2019, in collaboration with King's College London, we sponsored a public lecture on AI and medicine. This event was very well supported and a huge success with 215 attendees, who all enjoyed the networking reception that followed.

Much of the year was dominated by the recruitment of a new CEO. Rosemary Cook CBE announced in March that she would be retiring at the end of August. Rosemary had been with IPEM for 7 years and worked diligently for the Institute, particularly in revising IPEM's governance structures. Much effort was expended from March until September to select a successor of excellence. We used a recruitment agency, Anderson Quigley, and an IPEM recruitment committee, comprising senior members of the Board of Trustees to oversee the

process. There were some excellent applicants leading to a short list of 4, who were invited to formal interviews in York. We are delighted that Philip Morgan accepted the offer to become the Institute's new CEO. Philip started his new position at the beginning of 2020. We owe Kathryn Surtees a debt of gratitude for stepping up to be interim CEO from September until year end.

Three of our members achieved great success at the Chief Scientific Officer's awards this year, Sofia Kordolaimi, Ela Bardan and Mark Tooley.

Our annual Medical Physics and Engineering Conference was held in Bristol and was well received with some excellent presentations. You can read more about this later in the report.

The Little Linacs, otherwise known as Past President David Brettle's baby, were launched in 2018 at the York MPEC and the members' concert. The linacs have now achieved global success with almost 3,000 sold. One of these kits was bought by the Science Museum and is now on permanent exhibit there.

I would like to thank all members for their continued enthusiasm and contribution to IPEM's activities as

a charity, professional body and learned society. The membership of our Institute is approximately 5000 at present. Dwindling volunteer numbers are, however, a major risk to our organisation. I think back to the late and great Sir Winston Churchill: All IPEM members should be so very grateful to the few, who give of their time so generously. I also think back to Lord Kitchener: IPEM needs you.

IPEM could not exist without the staff in the National Office in York, led in 2019 by both Rosemary and Kathryn. We must thank all IPEM staff for their great efforts supporting IPEM to be a successful, solvent and well-respected organisation, both nationally and internationally.

Stephen A. O'Connor

Professor Stephen O'Connor,
President

Mark Tooley

Professor Mark Tooley FREng,
Immediate Past President



Big Bang Fair brilliant reaction by girl to stimulus



Big Bang Fair boy reacting to stimulus



Big Bang Fair girl with ultrasound



Big Bang Fair girl with model

Outreach and public engagement

We supported more than 100 outreach and public engagement events across the UK, involving IPEM member volunteers. These were in a variety of venues, from hospital open days to school visits, higher education institutions to science fairs.

As in previous years, IPEM had a stand at the annual Big Bang Fair, which provided the Institute with the opportunity to meet and engage with thousands of young people at the event, which was held at the NEC in Birmingham.

Two public lectures were held during the year. The second Peter Wells Memorial Lecture, in conjunction with the Institution of Engineering and Technology and the Institution of Mechanical Engineers, was given by Professor Molly Stevens, of the Institute of Biomedical Engineering, Imperial College London, and a very successful joint lecture with King's College London on Artificial Intelligence and Medical Physics, which was attended by more than 200 people.

The latest in 'The Science & The Scientists' leaflet and poster series was published, on special seating for wheelchair users.



Big Bang Fair

Prizes, grants and awards

IPEM handed out £60,029 in prizes, grants and awards in 2019 as follows:

- Grants and awards totalling £54,229
- Prizes totalling £5,800

Gold Medal awards were presented at the MPEC conference in Bristol to members who had made outstanding contributions in their area of work. Recipients were Dr Huda Al Naemi, awarded the Healthcare Gold Medal, Professor Andy Beavis, awarded the Innovation Gold Medal, and Professor Panicos Kyriacou, awarded the Academic Gold Medal. To read more about them and the other award recipients and the journal prize winners, visit www.ipem.ac.uk/AboutIPEM/PrizesandAwards/PastWinners.aspx

Three members were honoured at the annual Chief Scientific Officer awards. Professor Mark Tooley, Immediate Past President of IPEM, was presented with the Healthcare Science Lifetime Achievement award. Sofia Kordolaimi, a medical physicist at Nottingham University Hospitals NHS Trust, was named as one of the two Healthcare Science Rising Stars, and Ela Bardan, Deputy Head of Clinical Engineering at United Lincolnshire Hospitals NHS Trust, was part of the team who won the Excellence in Workforce Development award.



Other prize winners during the year included:

- IPEM Fellow Professor David Hawkes, of University College London, awarded the inaugural Peter Mansfield Medal and Prize by the Institute of Physics for his work on medical imaging research.
- Professor John Crowe was part of the University of Nottingham's engineering department team who were presented with the Colin Campbell Mitchell Award from the Royal Academy of Engineering for developing the world's first wireless foetal monitor.
- Dr Dimitra Darambara, team leader, Multimodality Molecular Imaging in the Department of Physics at the Institute of Cancer Research, was the recipient of the Philips Award from the Institute of Physics for championing the medical physics discipline.
- Andy Rogers, the Past President of the British Institute of Radiology, was awarded the BIR's Distinguished Service Medal for his contribution to the activities of the organisation.
- Ahmar Iqbal, a medical engineering apprentice at Leeds Teaching Hospitals NHS Trust, won the Health, Medical and Social Care category at the Asian Apprenticeship Awards.



Innovation Grant recipients 2019

Name and Organisation:

Dr Angela Darekar
MRI Physicist
University Hospital Southampton
NHS Foundation Trust

Project Title:

Validation of the use of MRI for image guided cryoablation

Amount:

£6,620

Name and Organisation:

Dr Benjamin Metcalfe
Lecturer (Assistant Professor)
Electronic & Electronic Engineering
Department, University of Bath

Project Title:

A new approach to continuous EEG monitoring for prognostication in post cardiac arrest patients with hypoxic-ischaemic brain injury

Amount:

£5,750

Name and Organisation:

Dr Fiammetta Fedele
Consultant Medical Physicist
Guy's and St Thomas'
NHS Foundation Trust

Project Title:

ATOM: A standard Test Object for Magnetic Resonance guided High Intensity Focused Ultrasound

Amount:

£10,000

Name and Organisation:

Dr Jonathan Gear
Radioisotope Physicist
Institute of Cancer Research & Royal
Marsden NHS Foundation Trust

Project Title:

Development of 3D Printed Radioactive Test Objects for Performance and Quality Assurance of Molecular Imaging Systems

Amount:

£9,349

Name and Organisation:

Dr Todd Stewart
Medical Engineering Programme Manager,
University of Leeds

Project Title:

Development of a pinning guide to improve the accuracy of placement of Kirschner pins in the repair of supracondylar fractures of the distal humerus in children

Amount:

£6,760

Scientific meetings

Throughout 2019 IPEM organised a total of 24 scientific meetings and events, which were attended by almost 1,400 delegates. IPEM also held three webinars for members across the year.

The annual Medical Physics and Engineering Conference (MPEC) was held in the historic maritime city of Bristol across three days and included the popular free Members' Day. The theme of the conference as Dr Tony Dix, Chair of the MPEC Programme Committee said in his opening programme notes, was all about *The Role of Science and Engineering in Shaping the Future of Healthcare*.

A new IPEM President was welcomed as Professor Stephen O'Connor received the President's chain of office from outgoing President Professor Mark Tooley during the Annual General Meeting.

Peals of laughter rang round the plenary lecture hall as scientist, broadcaster, journalist and author Vivienne Parry gave a hugely entertaining and humorous talk moments after she received her Honorary Fellowship of IPEM.

Prizes were presented, a new award was launched, and a party was held to mark the 40th anniversary of IPEM's international journal *Medical Engineering & Physics*, with current Editor-in-Chief Dr Richard Black there to lead the celebrations.



Vivienne Parry and Professor Mark Tooley

Peals of laughter rang round the plenary lecture hall as scientist, broadcaster, journalist and author Vivienne Parry gave a hugely entertaining and humorous talk



Dr Richard Black MEP Editor



eBooks



Dr Tony Dix, chair of MPEC Programme Committee



MPEC delegates



Professor Stephen O'Connor (left) and Professor David Brettell the Roy Ellis Patient Benefit award



Professor Stephen O'Connor and Professor Mark Tooley



Fellows	288
Associate Members	1,151
Affiliate Members	1,174
Full Members	2,404
Professional Affiliate Members	7
New members overall in 2019	523

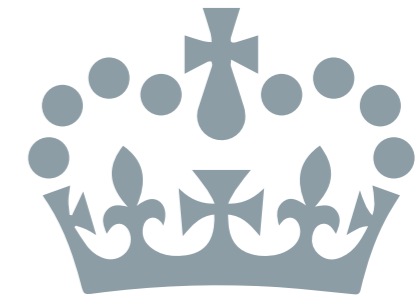
Almost **3,000 Little Linac kits** were sold, with orders from as far afield as Australia, New Zealand, the USA, Mexico and Peru



Organised **24 scientific meetings and events**, with **1,376 attendees**, and held **3 webinars**



Contributed to **14 Government and other policy consultations**



Celebrated the **40th anniversary** of the Medical Engineering and Physics journal



IPEM Institute of Physics and Engineering in Medicine

There were **1.34 million downloads** from IPEM journals

Launched the Communities of Interest



Supported **119 members** on national, European and international standards groups



Delivered **105 outreach and public engagement events**



Published **9 new scientific reports** through the international ebooks programme to help members maintain high standards of practice

IPEM handed out **£60,029 in prizes, grants and awards** in 2019 as follows:



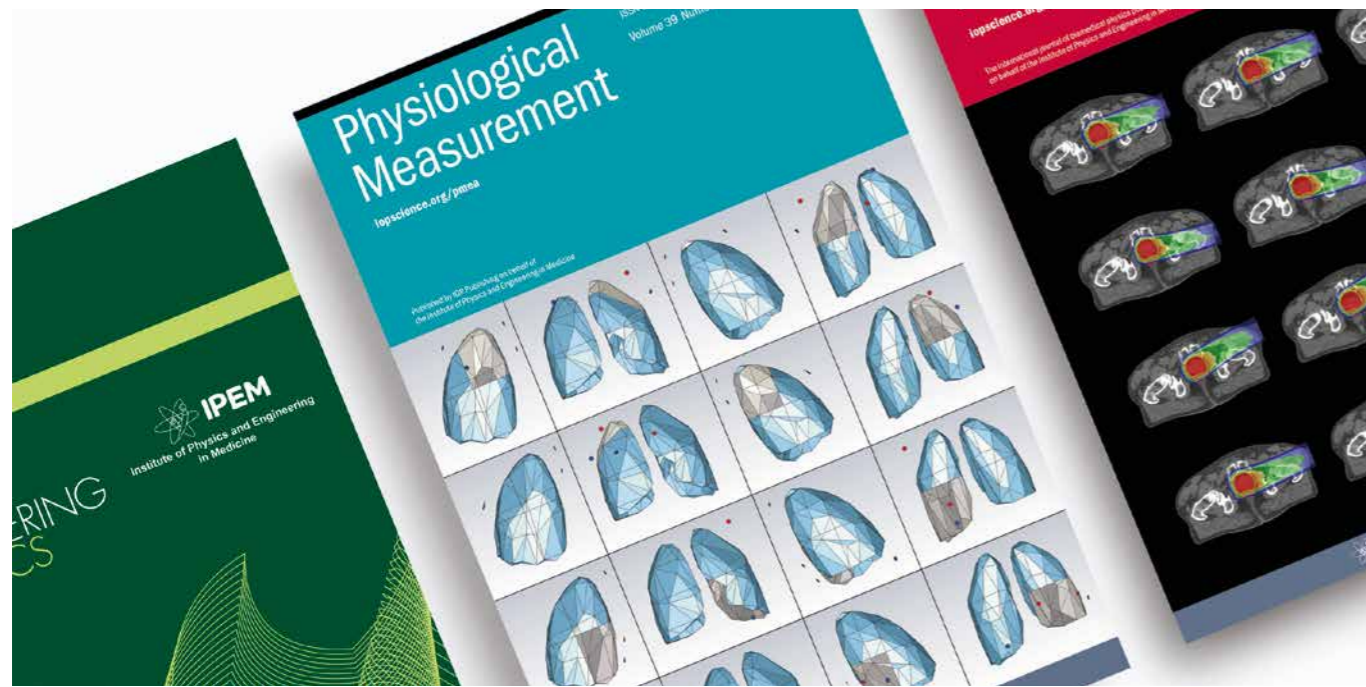
Invested almost **£38,500** in innovation projects to improve care



Grants and awards totalling **£15,750**



Prizes totalling **£5,800**



International journals and ebooks

IPEM's ebook programme with publishers IOPP had a very successful year, with a further nine ebooks being published and more authors being signed up to continue the series into 2020 and beyond.

Physics in Medicine & Biology celebrated a fantastic increase in its Impact Factor in 2019 to 3.030, maintaining its top position within the field of Medical Physics. The journal received more submissions of Topical Review articles than ever before and published 9 Topical Reviews on a variety of different topics. Geographically the journal expanded, receiving submissions from 66 different countries, which highlights and solidifies its broad international reach.

The year saw a period of transition for Physiological Measurement as Editor-in-Chief Professor Randall Moorman stepped down at the end of the year, and Professor Xiao Hu took up the post at the start of 2020. The focus collection programme, which highlights new research in hot topics across the journals' scope, continued to thrive and Physiological Measurement published articles within 11 different focus collections and opened 4 new collections for submissions.

Medical Engineering & Physics celebrated its 40th Anniversary in 2019 with the publication of a Special Issue online at www.sciencedirect.com/journal/medical-engineering-and-physics/vol/72/suppl/C and 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.

Physics in Medicine & Biology celebrated a fantastic increase in its Impact Factor in 2019 to 3.030

Physics in Medicine & Biology

Published by: IOPP
Submissions: 1,426
Publications: 567
Issues: 24
Impact Factor: 3.030
Downloads: 790,202
Ranking:
 26/80 (Q2) Engineering, Biomedical
 39/129 (Q2) Radiology, Nuclear Medicine & Medical Imaging

Physiological Measurement

Published by: IOPP
Submissions: 515
Publications: 169
Issues: 12
Impact Factor: 2.246
Downloads: 231,600
Ranking:
 45/73 (Q3) Biophysics
 41/83 (Q3) Engineering, Biomedical
 48/81 (Q3) Physiology

Medical Engineering & Physics

Published by: Elsevier
Submissions: 685
Publications: 169
Issues: 12
Impact Factor: 1.785 (2018)
Downloads: 324,457
Ranking:
 55/80 in Engineering, Biomedical

International

In recognition of the challenges faced by some medical physicists and clinical and biomedical engineers internationally to access professional activities in their local areas, in 2019 IPEM launched a new award.

The Low and Middle Income Countries (LMIC)* Sponsorship Award seeks to support future leaders in the field of physics and engineering in medicine.

Professor Dan Clark, IPEM's Vice President International, officially launched the award at the annual Medical Physics and Engineering Conference in Bristol. It provides Associate Membership for two years, mentorship from an experienced IPEM professional and eligibility to apply for funding from the IPEM LMIC Support Grant. This grant provides funding of up to £150 per year of sponsored membership.

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

In 2019 IPEM attended the IEEE Engineering in Medicine and Biology conference, which was held in Berlin, Germany, and the 24th International Conference on Medical Physics in Santiago, Chile.



*as defined by the Organisation for Economic Co-operation and Development



Professor Dan Clark, IPEM Vice President International



Campaigns

At the start of the year, two Fellows had a great idea – why not tap into members' writing skills to create stories to use for outreach with children? And so, the Great IPEM Short Story competition was launched.

Members were asked to pen a short story of up to 1,000 words on medical physics or clinical engineering aimed at children in two age categories, under 11 and 11 to 16.

All the entries were anonymised, and a panel of judges picked a winner from each one. It was a well-deserved round of applause to member Katharine Thomson who won – twice! She entered stories in each category and the judges picked them as the winner in each.

Katherine, a medical physicist in the Nuclear Medicine Department at Derriford Hospital in Plymouth, had her stories published in Scope. You can read Katherine's winning entries, and the shortlisted stories, here: www.ipem.ac.uk/AboutIPEM/Campaigns/TheGreatIPEMShortStoryCompetition.aspx

Throughout the year, the Little Linac campaign saw sales being made across the globe as the model continued to prove to be extremely popular with children and healthcare professionals alike. The model now also has pride of place in the new Medicines Gallery at the Science Museum in London.

IPEM also participated in the Lottie Tour, organised by the Women's Engineering Society. Lottie was a doll that travelled the country to visit women engineers who took photographs of her at their work to help promote the amazing and varied careers available in engineering.



Lottie and Little Linac model

Throughout the year, the Little Linac campaign saw sales being made across the globe as the model continued to prove to be extremely popular with children and healthcare professionals alike.

Policy and consultation

IPEM members and officers were busy on a wide range of policy and consultation matters, including two significant victories being achieved. The following gives a flavour of some of the areas IPEM was involved in throughout the year.

An apparent funding shortfall from Health Education England (HEE) threatened the intake to the Scientist Training Programme (STP). Professor Stephen O'Connor, IPEM's President, wrote to HEE to reiterate the Institute's concerns about the reduction in funding. HEE replied to confirm all STP trainees for the 2020/21 financial year would be funded.

The Office for National Statistics (ONS) launched the Standard Occupation Classification (SOC) extension project. With the launch of the project, IPEM took the opportunity to seek clarity about the classification of medical physics, which had been an area of concern for a number of years. The ONS subsequently confirmed that for the 2020 edition of the SOC, the classification for medical physicists would be given a more suitable classification, confirming medical physicists' status as healthcare

professionals, essential to the provision of a cutting edge healthcare service. The clinical engineers code was also changed.

The Migration Advisory Committee (MAC) launched a consultation on the National Shortage Occupation List, with IPEM providing data on workforce and vacancy rates. The Institute also expressed concerns to a separate MAC inquiry about the potential use of an Australian-style points based system for immigration.

The NHS Long Term Plan was published and IPEM broadly welcomed the plan, particularly the focus on innovation in the NHS and investment in new equipment for imaging and radiotherapy, including CT and MRI scanners.

A new campaign was launched – Radiotherapy4Life – at the House of Commons, backed by Action Radiotherapy and supported by

IPEM, along with other professional bodies. IPEM member Dr John Sage represented IPEM at this. The campaign calls for an increase in the cancer budget for radiotherapy, from 5 per cent to 6.5 per cent, with a one-off, ring-fenced investment of £250m to provide comprehensive regional access to radiotherapy, a further £100m a year ongoing investment in staff and IT infrastructure, and the establishment of a radiotherapy tsar.

In support of this, the All Party Parliamentary Group for Radiotherapy launched an inquiry into the current and future state of radiotherapy provision across the UK. IPEM supplied written evidence to the inquiry, and IPEM member Dr Vivian Cosgrove gave oral evidence to the inquiry at the House of Commons.



Honorary Treasurer's Report

The Outturn for 2019 was an operating surplus of £450,460. This was achieved against the original plan of a deficit of £104,203.

The net surplus for the Group in 2019 is £450,460, compared to a net surplus in 2018 of £207,169, an increase of £243,291 (117%). This consists of a net surplus in 2019 on Unrestricted Funds of £424,806 (2018: net surplus of £191,824) and a net profit in 2019 of £25,654 (2018: net profit of £15,345) on Restricted Funds.

The net surplus for the Group in 2019 arises from £1,523,527 of income (compared to £1,470,308 in 2018, a 4% increase of £53,219) less £1,271,947 of expenditure (compared to £1,268,365 in 2018, a negligible increase of £3,582) plus a substantial unrealised gain on investments in 2019 of £198,880 (compared to £5,226 in 2018).

The Group's cumulative surplus stood at £3,071,471 at 31 December 2019, of which £427,676 is currently financing tangible fixed assets.

The Finance and Business Planning Committee have continued to work on ways to mitigate the risks caused by a changing environment, including the significant long-term risk to IPEM's Journal income which might arise from developments in Open Access publishing. The free reserve requirement has been increased by £1,000,000 to reflect this increased risk. This is now £2,500,000, consisting

of a Target Operating Reserve of £750,000 and a Designated Reserve of £1,750,000.

We entered 2020 with a robust balance sheet, with reserves comfortably above this requirement. The COVID 19 pandemic has, however, caused us to operate differently and we have had to cancel many of our scientific and other meetings. We have done some detailed financial modelling on the likely impact of the pandemic on our finances and despite these significant changes to our planned activities for the current year we expect the net impact to our budgeted outcome to be minimal. We have the added reassurance that we have cash reserves and the ability to draw down from our investments if required.

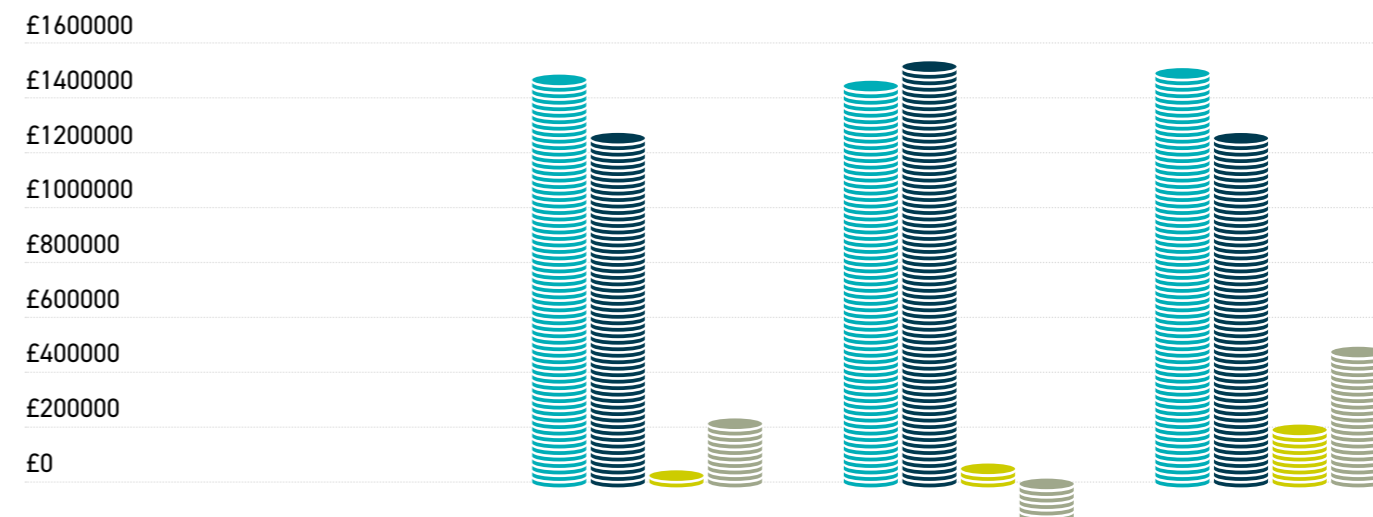
John Turner

John Turner
Honorary Treasurer



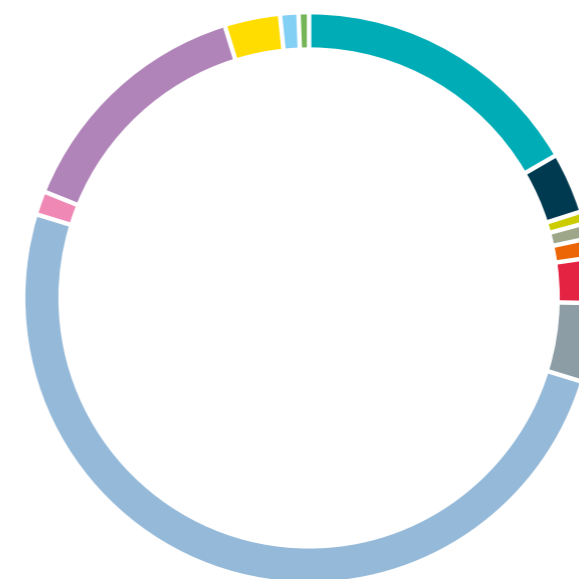
The Finance and Business Planning Committee have continued to work on ways to mitigate the risks caused by a changing environment

Consolidated Statement of Financial Activity 2019



	2018 Actual	2019 Budget	2019 Actual
Income	£1,470,308	£1,430,660	£1,523,527
Expenditure	£1,268,365	£1,561,863	£1,271,947
Unrealised Gain on Investments	£5,226	£27,000	£198,880
Net Movements in Funds	£207,169	(£104,203)	£450,460

IPEM Consolidated Income 2019



Membership Subscriptions	£253,171	16.62%
RCT Registrations	£53,248	3.50%
Journal Subscriptions	£8,082	0.53%
Advertising	£9,825	0.64%
Training Scheme Fees	£18,170	1.19%
International Support	£43,782	2.87%
Other Charitable Income	£62,489	4.10%
Journal Income	£768,740	50.46%
Books and Reports	£18,865	1.24%
Scientific Meetings	£214,713	14.09%
Income from Trading Activities	£60,314	3.96%
Investment Income	£11,323	0.74%
Other Income	£805	0.05%
	£1,523,527	100.00%

Honorary Secretary's Report 2019

IPEM is a registered limited company and a charity, and its Board members are therefore both directors of the company and charity trustees. The Board, which meets quarterly, has legal responsibility for corporate compliance and for governance, financial, strategic and risk matters. Detailed management of finance and risk is overseen by the Finance and Business Planning committee, which reports directly to the Board.

In August 2019, Rosemary Cook, CBE, retired as Chief Executive Officer after seven years with IPEM. Before her departure, Rosemary audited IPEM's compliance with the Charity Code of Governance. The outcome was very positive and, in areas for improvement, IPEM aims to achieve full compliance by 2021. We would like to record our grateful thanks to Rosemary for her leadership and guidance to the Board during her term in office. Our new Chief Executive Officer, Philip Morgan, was appointed to join us in January 2020 and we extend a warm welcome to Philip in his new role.

During the year we also welcomed a new President, Professor Stephen O'Connor, who was appointed at IPEM's Annual General Meeting, held on 23 September 2019, at the MPEC conference in Bristol. A new Board role of Immediate Past President was created to enable Trustees to continue to benefit from the outgoing President's experience, and Professor Mark Tooley is the first person to hold the post.

The following new Trustees were appointed:

- Dr Emma Bowers, Director of the Professional and Standards Council
- Dr Benjamin Metcalfe, Member Trustee.

Mr John Turner, Independent Non-Member Trustee, took over the role of Honorary Treasurer.

Professor Marcel van Herk and Vivienne Parry were appointed as Honorary Fellows of IPEM.

The end of the year saw the retirement of the following Trustees and we thank them for their contributions:

- Dr Robert Farley
- Mr David Ellis
- Dr Christopher Callicott.

IPEM's work on equality and diversity continued in 2019. Amongst the work undertaken, IPEM held an LGBTQ+ workshop at the AGM, published blogs on LGBTSTEM Day and on the International Day of People with Disabilities, and continued to participate in monitoring progress in diversity alongside other scientific institutions.

IPEM launched its Communities of Interest in January 2019, which cover all aspects of medical physics, clinical and biomedical engineering, reflecting the wide range of work and interests of our members. We are grateful to all our members for contributing their time and expertise to IPEM and for helping to deliver on IPEM's charitable objectives.



As always, IPEM relies 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. The list of these contributing members is hosted on the IPEM website and you can see it at www.ipem.ac.uk/Members/CommitteesGroups.aspx

Danielle Ross

Danielle Ross
Honorary Secretary

In Memoriam

During 2019, the Institute recorded with regret the deaths of the following members, notified during the year:

- Dr David Hitchings
- Dr Mark Borg
- Professor Terence Burlin
- Dr Anthony Bradshaw
- Professor Garth Hastings

IPEM's Board of Trustees



Staff at the IPEM National Office*

Philip Morgan
Chief Executive Officer

Kathryn Surtees
Head of Operations and Finance

Jemimah Eve
Head of Workforce Intelligence and Training

Marie Goodall
Executive Assistant

Kelly Dade
Office Administrator

Eva McClean
Communications and Development Manager

Sean Edmunds
External Relations Manager

Candi Colbourn
Conferences Manager

Jessica Bagnall
Conference Services Administrator

Fiona McKeown
External and International Services Manager

Sally Hawking
External and International Services Manager

Steve Mattin
Membership Manager

Anna Glavocih
Membership Services Administrator

Elaine Gears
Membership Services Administrator

Adam Hyett
Workforce Intelligence Administrator

Nicola Parkinson
Finance Officer

Sandra Wilkinson
Finance Assistant

*as of June 2020




IPEM Institute of Physics and
Engineering in Medicine


Institute of Physics and Engineering in Medicine
Fairmount House, 230 Tadcaster Road, York, YO24 1ES

Tel: 01904 610821

Email: office@ipem.ac.uk

www: www.ipem.ac.uk

 [@ipemnews](https://twitter.com/ipemnews)

 [Institute of Physics and Engineering in Medicine](https://www.linkedin.com/company/institute-of-physics-and-engineering-in-medicine)

Registered in England and Wales No. 3080332. Registered Charity No. 1047999.