

PET is Wonderful

Annual Scientific Meeting 2022

27th–28th September 2022

Royal Society of Edinburgh, Scotland

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Meeting Organisers:
Adriana Tavares, University of Edinburgh
Anne Grant, University of Edinburgh
Bea Andrews, University of Edinburgh
Carlos Alcaide, University of Edinburgh
Tim Morgan, University of Edinburgh
Victoria Reid, University of Edinburgh

Abstract Review Committee:
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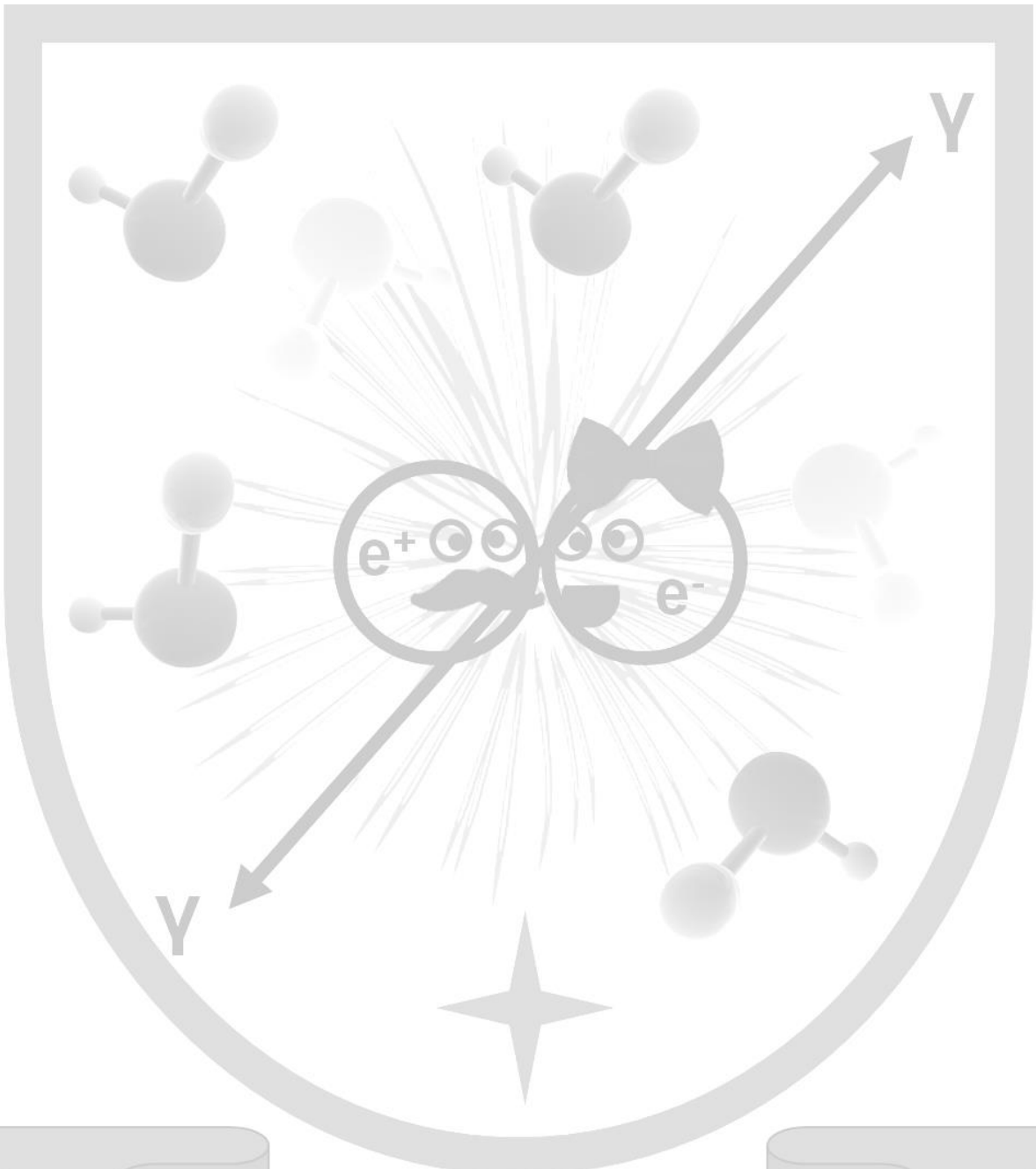
Tim Morgan, University of Edinburgh



PET is Wonderful

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PET IS WONDERFUL MEETING – 27TH SEPTEMBER 2022
FINAL PROGRAMME - UK time zone

DAY 1 – EDUCATIONAL SESSIONS, sponsored by CZI with live streaming

9:00	**Registration opens** **Welcome teas/coffees**
9:45 – 10:00	**Celebrating the 5th anniversary of the PiW meetings** Adriana Tavares, University of Edinburgh, UK
10:00 – 12:00	**Educational session, Part 1** **PET radiotracer development** Chair: Tim Morgan
60 min	**The process of developing new PET radiotracers** Steve Archibald, Hull Molecular Imaging Centre, UK
60 min	**Design of PET radiotracers - metabolic considerations** Vic Pike, National Institutes of Health (NIH), USA
12:00 – 13:30	**Lunch break** **Poster session**
13:30 – 15:30	**Educational session, Part 2** **PET kinetic modelling and simplified methods for PET quantification** Chair: Vesna Sossi
60 min	**Principles and applications of PET kinetic modelling** Rich Carson, Yale University, USA
60 min	**Reference tissue models and other simplified methods of PET quantification** Adriaan Lammertsma, Amsterdam UMC, Netherlands
15:30 – 16:00	**Coffee break and networking**
16:00 – 18:00	**Educational session, Part 3** **Network analysis, radiomics and artificial intelligence** Chair: Tommaso Volpi
60 min	**Molecular Imaging of Brain Connectivity** Igor Yakushev, Technical University of Munich, Germany
60 min	**Radiomics and artificial intelligence applied to PET imaging: principles and applications** Irene Buvat, Institute Curie, France
18:00	**END 1st day of meeting**

PET IS WONDERFUL MEETING – 28TH SEPTEMBER 2022
FINAL PROGRAMME - UK time zone

DAY 2 – PET HAPPY STORIES & CONTINUED DEVELOPMENT, with live streaming

9:00	**Registration opens** **Welcome teas/coffees**
10:00 – 10:35	**Gamma Prize PET Contest 2020 Winner** *Chair: Adriana Tavares* **Quantitative [^{18}F]FDG brain studies with image-derived input functions: impact of different extraction sites** Tommaso Volpi, Padova Neuroscience Centre, Italy
10:35 – 11:35	**Continued education** *Chair: Adriana Tavares* • **FAIR principles: guidelines and applications.** Dario Longo, National Research Council of Italy, Italy. • **The ARRIVE guideline 2.0.** Matt Brooke, NC3Rs, UK. • **AQARA principles.** Wolfgang A. Weber, Technical University Munich, Germany.
11:35 – 12:30	**PET (happy) stories – careers** *Chair: Irene Buvat and Igor Yakushev* **Career journeys by: Adriaan Lammertsma; Vesna Sossi; and Vic Pike**
12:30 – 14:00	**Lunch break and networking** **ePoster session**
14:00 – 14:50	**Keynote speaker talk 1** Chair: Rich Carson
50 min.	**Quantitative brain PET imaging** Vesna Sossi, University of British Columbia, Canada
14:50 – 15:20	**Proffered talks, Part 1** *Neuroimaging and kinetic modelling* ¦ Chair: Steve Archibald
15 min.	**Synaptic Density PET Imaging: Development of an Organocatalytic Enantioselective Synthesis to [^{18}F]SynVesT-1** Holly McErlain, University of Glasgow, UK
15 min.	**Investigating the use of simultaneous amyloid PET/ASL-MRI for reduced time acquisitions: a simulation-based study** Bea Andrews, University of Edinburgh, UK
15:20 – 16:00	**Coffee break and networking**
16:00 – 16:30	**Proffered talks, Part 2** *Multi-tracer and total-body PET imaging* ¦ Chair: Geoff Warnock
15 min.	**Combined [^{68}Ga]Ga-PSMA-11 and low dose 2-[^{18}F]-FDG PET/CT using a long-axial field of view scanner for patients referred for [^{177}Lu]-PSMA-Radioligand therapy** Ian Alberts, University of Bern, Switzerland
15 min.	**Dose Reduction and Image Enhancement in preclinical Total Body PET using Deep Learning** Florence Muller, University of Ghent, Belgium
16:30 – 17:00	**Meeting Prizes** Best proffered talk prize, best poster prize and best VIP PET Prize **End of Meeting**

Keynote Speaker:

Vesna Sossi



Professor Vesna Sossi received a Laurea degree in high energy Physics from the University of Trieste Italy and a PhD in Nuclear Physics from the University of British Columbia in 1991. After completing her graduate degree, she went on to a post-doctoral fellowship in the UBC/TRIUMF PET group working on Medical Imaging. She is currently a Professor in the Physics and Astronomy Department and Adjunct Professor in Medicine at UBC and has been leading the UBC Positron Emission Tomography (PET) brain imaging program since 2009.

Professor Sossi's expertise and research interests lie in using clinical and preclinical imaging to investigate neurodegeneration and other brain diseases through development of instrumentation, data quantification, image analysis, kinetic modelling, image reconstruction and novel imaging protocols. She is particularly interested to further develop and exploit hybrid PET/MR imaging to gain access to as yet poorly investigated aspects of brain function such as brain energetics and neurovascular coupling in the healthy brain and as affected by neurodegeneration and exercise, as well as other possible neuroprotective mechanisms. Some examples of her research are: the development of a complex dopamine turnover measurement using PET in humans and rodents and the demonstration of its relevance to Parkinson's disease, first applications of texture and pattern analyses to PET imaging of several neurotransmitter systems, particularly well-suited to identify interactions between systems, and a recent development of an MRI compatible PET insert.

She has over 210 peer reviewed journal publications, and actively trains many graduate and undergraduate students. Professor Sossi sits on several national and international review committees and received several CFI, NSERC and Michael Smith Foundation for Health Research awards during her career.

Invited Lecturers:

Steve Archibald



Research areas in the Archibald group are PET probe development, chemokine receptor imaging and lab-on-a-chip/ microfluidic devices for radiosynthesis and quality control.

Prof Archibald was awarded a first class BSc degree in Chemistry, Life Systems and Pharmaceuticals by the University of York in 1992 and a PhD in Chemistry by the University of Edinburgh in 1995. He carried out postdoctoral research at the Universities of Paris-Sud (France), Kansas (USA) and York (UK), before being appointed as a lecturer at the University of Hull in 2000.

Prof Archibald was promoted to Senior Lecturer in 2008, Reader in 2011, Director of the Positron Emission Tomography Research Centre in 2013 and Professor in 2014.

Victor W. Pike



Dr. Victor W. Pike received his B.Sc. (Hons) degree in chemistry from the University of Birmingham (UK) in 1972 and his Ph.D. in organic chemistry from the same University in 1975. Following a postdoctoral fellowship at Birmingham University, he joined the MRC Cyclotron Unit (Imperial College, London) in 1978 at the foundation of its strong research program in positron emission tomography (PET), eventually becoming Head of its Chemistry and Engineering Section. Dr. Pike has a strong personal interest in all chemical aspects of the discovery, development and evaluation of novel radioactive probes for molecular imaging with PET. Dr. Pike has received a Marie Curie Award, Springer Prize, and Michael J, Welch Award for his work in this area. He has co-authored about 350 peer reviewed scientific articles. He joined the Molecular Imaging Branch of NIMH in 2001 as Chief of the PET Radiopharmaceutical Sciences Section (PRSS).

Dr Pike's Section is focused on developing novel radioactive probes (radiotracers) for the investigation of neuropsychiatric disorders with PET. This research mainly encompasses medicinal chemistry for probe discovery and radiochemistry for labelling candidate probes with a short-lived positron-emitter. In Dr Pike's laboratory, radiotracers for imaging and quantifying various protein targets (e.g. plaques, transporters, enzymes or neurotransmitter receptors) in brain are in development. The imaging targets have included Aβ-amyloid plaque, TSPO (previously known as PBR) binding sites, the efflux transporter P-gp, the receptors mGluR5, mGluR1, CB1 and 5-HT_{1A}, and the enzymes O-GlcNACase, PDE4D, PDE4B, COX-1 and COX-2. Development of methodology for radiolabeling with carbon-11 and fluorine-18 is key to successful radiotracer development and is a major component of the Section's research.

Richard Carson



Professor Richard E. Carson received his PhD from UCLA in 1983 in Biomathematics. From that time on, he has focused his research on the development and application of mathematical techniques for the study of human beings and non-human primates with Positron Emission Tomography (PET). After 22 years in the PET program at the National Institutes of Health, in 2005, Prof Carson joined the faculty of Yale University as Professor of Biomedical Engineering and Diagnostic Radiology. Currently, he is Director of the Yale PET Centre and the Director of Graduate Studies in Biomedical Engineering at Yale University.

Prof Carson has published over 375 papers in peer-reviewed journals and given over 175 invited lectures. Prof Carson has received numerous awards throughout the years in recognition of his ground-breaking contributions to the field of PET imaging, including: the Kuhl-Lassen award (2007), the Ed Hoffman Memorial Award from the Computer and Instrumentation Council of the Society of Nuclear Medicine (2009), Distinguished Investigator Award from the Academy of Radiology Research (2016), and the Edward J. Hoffman Medical Imaging Scientist Award from the IEEE (2017). Prof Carson also gave the prestigious Henry N. Wagner Jr. Lectureship at the Society of Nuclear Medicine and Molecular Imaging annual meeting in Philadelphia in 2018 and was named Fellow of the IEEE in 2019.

Adriaan Lammertsma



Professor Adriaan A. Lammertsma has been active in PET research since 1979, when he joined the MRC Cyclotron Unit, Hammersmith Hospital in London. Apart from a sabbatical year at UCLA, Los Angeles, he stayed in London until 1996, and then moved to the VU University Medical Centre in Amsterdam. Over the years his research focus has been the development and application of tracer kinetic models for quantitative PET studies with applications in neurology, cardiology and oncology. After his formal retirement in 2018, he remained active and still holds an honorary position at the Amsterdam University Medical Centres. Since 2020, he is advisor for the Medical Imaging Centre, University Medical Centre Groningen. In addition, he is visiting professor at the Neurobiology Research Unit, Copenhagen University Hospital. He is the 2012 recipient of the Kuhl-Lassen Award from the Society of Nuclear Medicine and the 2015 recipient of the ESMI Award from the European Society of Molecular Imaging. Adriaan Lammertsma is co-author of nearly 600 peer reviewed papers.

Igor Yakushev



Igor Yakushev obtained his MD in 2010 from the University of Mainz, Germany. In 2012, after residency in Psychiatry and Neurology, he moved to Munich for residency in Nuclear Medicine at the Technical University of Munich (TUM). Since 2013 he leads the research group “Multimodal imaging of normal and pathological cognition”. Since 2015 he is the Head of Neuroimaging at the Dept. of Nuclear Medicine, TUM. 2019-2020 Assistant Professor Igor Yakushev served in the Board of Directors of the Brain Imaging Council, Society of Nuclear Medicine and Molecular Imaging. Currently, he is an Associate Faculty at the Munich Centre for Neurosciences “Brain and Mind” and the Head of the international Molecular Connectivity Working Group. Igor Yakushev’s research is focused on mechanisms of brain connectivity and development of imaging-based biomarkers for neurodegenerative and neuro-oncological disorders. Herewith, he applies positron emission tomography, structural, functional MRI, and diffusion weighted imaging.

Irène Buvat



Irène Buvat received her PhD degree in “Particle and Nuclear Physics” from Paris Sud University, France, in 1992 and oriented her career towards applications of Nuclear Physics to Medical Imaging. She performed a post-doctoral fellowship at University College London, UK, and another at the National Institutes of Health, Bethesda, USA. In 1995, she entered the French “Centre National de la Recherche Scientifique”.

She is currently the head of the “Laboratory of Translational Imaging in Oncology” research lab at Institut Curie Research Centre in Orsay, France. Her research interests focus on developing quantification methods to make the most of SPECT and PET data coupled with CT or MRI for understanding biological mechanisms or optimizing patient management. She has been the spokesperson of the worldwide OpenGATE collaboration developing the GATE Monte Carlo opensource simulation tool dedicated to emission and transmission tomography and radiotherapy applications for 10 years. She is currently largely involved in radiomic and artificial intelligence approaches to further enhance the role of PET/CT and PET/MR in precision medicine, and supervises the development of the LIFEx software enabling user-friendly radiomic studies. She has always been very active in training students and in knowledge and software dissemination and promotes open-access to high-standard research material.

Invited Speakers – Continued Education Session:

Matt Brooke



After carrying undergraduate studies at Durham University in Biomedical Sciences, Dr Matt Brooke went on to achieve his PhD in Cutaneous Medicine from Queen Mary University of London in 2014. Dr Brooke then secured funding from the Medical Research Council (MRC), as a post-doctoral researcher, in order to further understand the biology of the Rhomboid protein iRhom2, the metalloprotease ADAM17 and the pathways they regulate. Later he carried out work, funded by the British Skin Foundation, studying the same pathways in the development of psoriasis. Dr Brooke became Program Manager for the reporting of animal research at the NC3Rs in 2020, where he works on the implementation of the ARRIVE guidelines and is a member of the Policy and Outreach group.

Wolfgang Weber



Professor Weber (b. 1967) is Director of the Department of Nuclear Medicine at “Klinikum rechts der Isar” (the University Hospital of the TUM) since 2018. He specialises in the field of molecular imaging and targeted radionuclide therapy. His research focus is the combination imaging and therapy of cancer (theranostics). Professor Weber obtained his doctorate at the TUM in 1995. He then worked as an associate professor at the University of California, Los Angeles from 2003–2007. In 2007, he became Chair of the Department of Nuclear Medicine at the University of Freiburg. From 2013–2017 he was Chief of the Molecular Imaging and Therapy service at Memorial Sloan Kettering Cancer Centre and Professor of Radiology at Weill-Cornell Medical College, New York. Professor Weber has published 250+ papers in numerous journals, including the Journal of Nuclear Medicine, the European Journal of Nuclear Medicine and Molecular Imaging, the Journal of Clinical Oncology, amongst many others. He has also served on the editorial boards of several medical journals.

Dario Longo

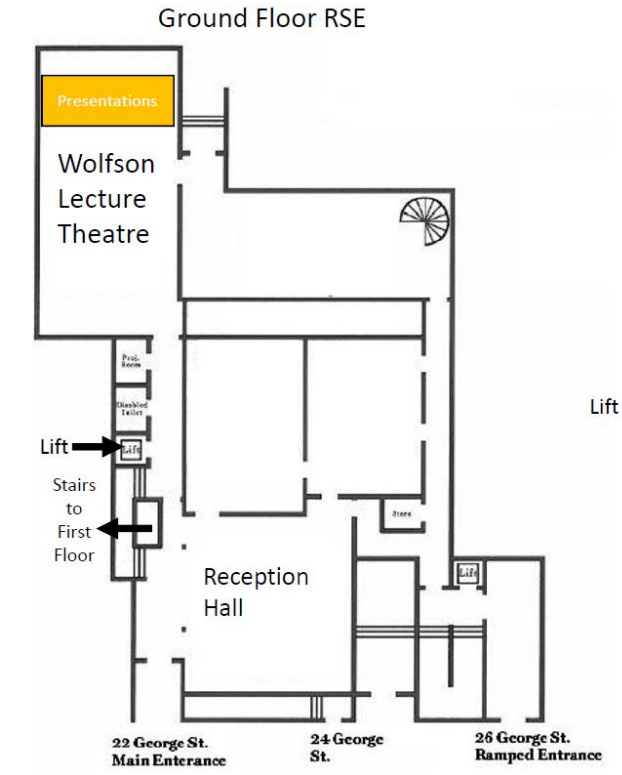


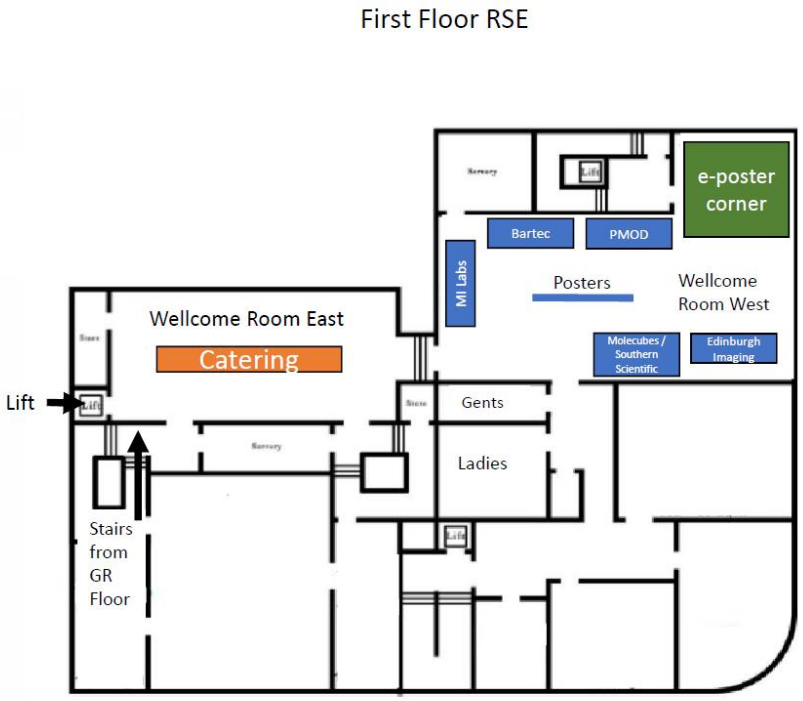
Prof. Dario Longo received his PhD in Biochemical Sciences from the University of Turin, Italy, in 2007. After working as a post-doctoral researcher in the MRI preclinical field at the Molecular Imaging Center of the University of Turin, he joined the National Research Council of Italy in 2014. Presently, he is the Head of the Research Unit of Torino of the Institute of Biostructures and Bioimaging (IBB) of the CNR and adjunct lecturer in Cancer Imaging at the University of Turin. His research aims to develop novel MRI-based methods for characterising tumour microenvironment properties (acidosis, vascularisation, hypoxia) in murine tumour models and developing and validating non-invasive MRI procedures and probes for improving diagnosis and assessment of treatment effects with a special focus on tumour metabolism and on antiangiogenic drugs. Dr Longo’s studies also focus on assessing pH imaging as a novel biomarker in cancer and in renal diseases. He also is involved in developing tools for improving the “FAIRification” (Findable, Accessible, Interoperable and Reusable) of medical image datasets within the Open Science concept, leading the Data Management working group for the Euro-BioImaging Research Infrastructure. Dario Longo is co-author of nearly 90 peer-reviewed paper and he is serving as Board Member for the European Society of Molecular Imaging (ESMI).

Poster Presentations:

#	Presenter Name	Poster Title
1	Holly Woodward	Deducing mechanisms of sexual dimorphism in valvular calcification
2	Mark Macaskill	Assessment of TSPO in a rat myocardial infarction model reveals a bi-phasic inflammatory signal, as well as an age related increase in cardiomyocyte TSPO expression
3	Robert Shaw	The development of a novel PET ligand for imaging oligodendrocyte function *in vivo*
4	Samuel Debono	Sodium [^{18}F]fluoride and [^{18}F]NOTA-RGDfk uptake in abdominal aortic aneurysm tissue
5	Beth Whittington	Non-invasive In Vivo Thrombus Imaging in Patients with Ischemic Stroke or Transient Ischemic Attack
6	Mark Macsuka	Feasibility of simultaneous dual-tracer PET imaging of [^{11}C]acetate and [^{18}F]FDG using a biexponential decay model
7	David Craig	*Pdgfb*$^{ret/ret}$ mice do not develop ectopic calcification in cardiovascular organs *in vivo*
8	Kalyani Pandya	Glucose metabolism is impaired in cardiac fibroblasts from aged rats compared with young rats
9	Liam Carr	Developing methods to plan successful in vitro body-on-chip pharmacokinetic studies

Venue Floorplan:





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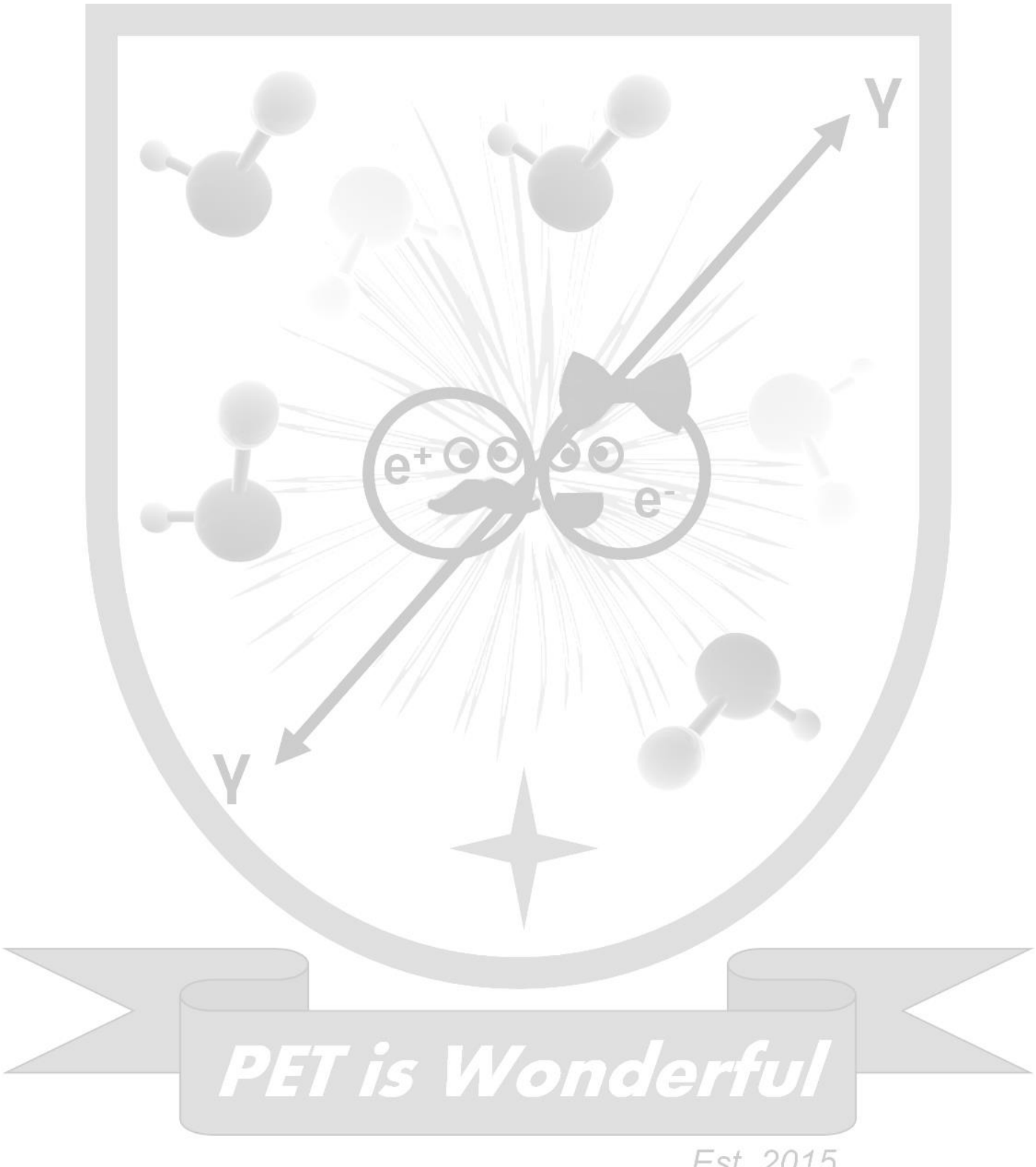
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