

**King's College London**

**School of Biomedical Engineering and Imaging Sciences**

**Postgraduate Research Symposium**

25<sup>th</sup> November 2019

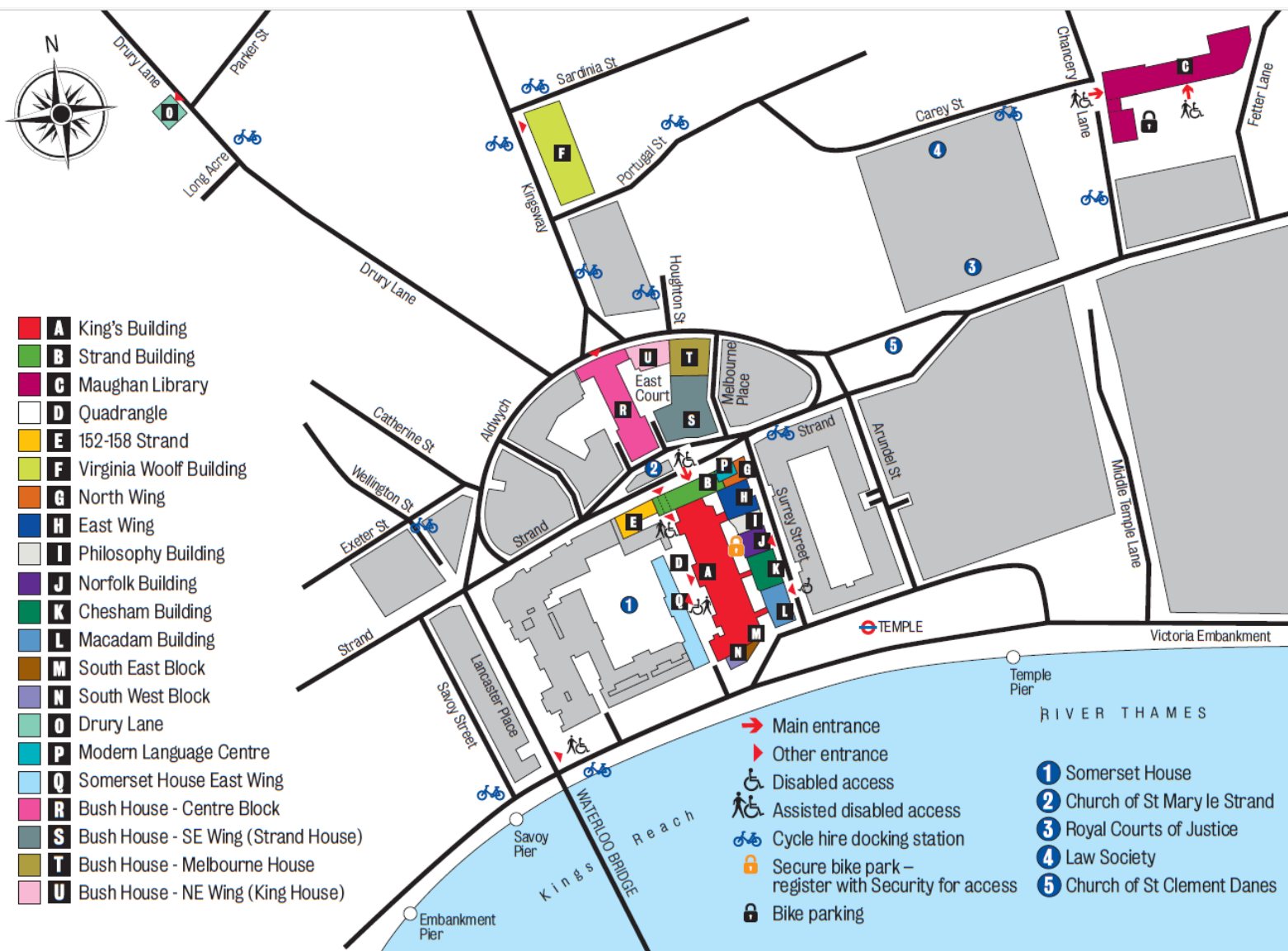
Great Hall, Strand Campus, King's College London, London, WC2R 2LS



# THE VENUE

The main event will take place in Great Hall (ground floor) and the poster sessions are in Council Room (second floor) - King's Building, Strand Campus, King's College London, London, WC2R 2LS.

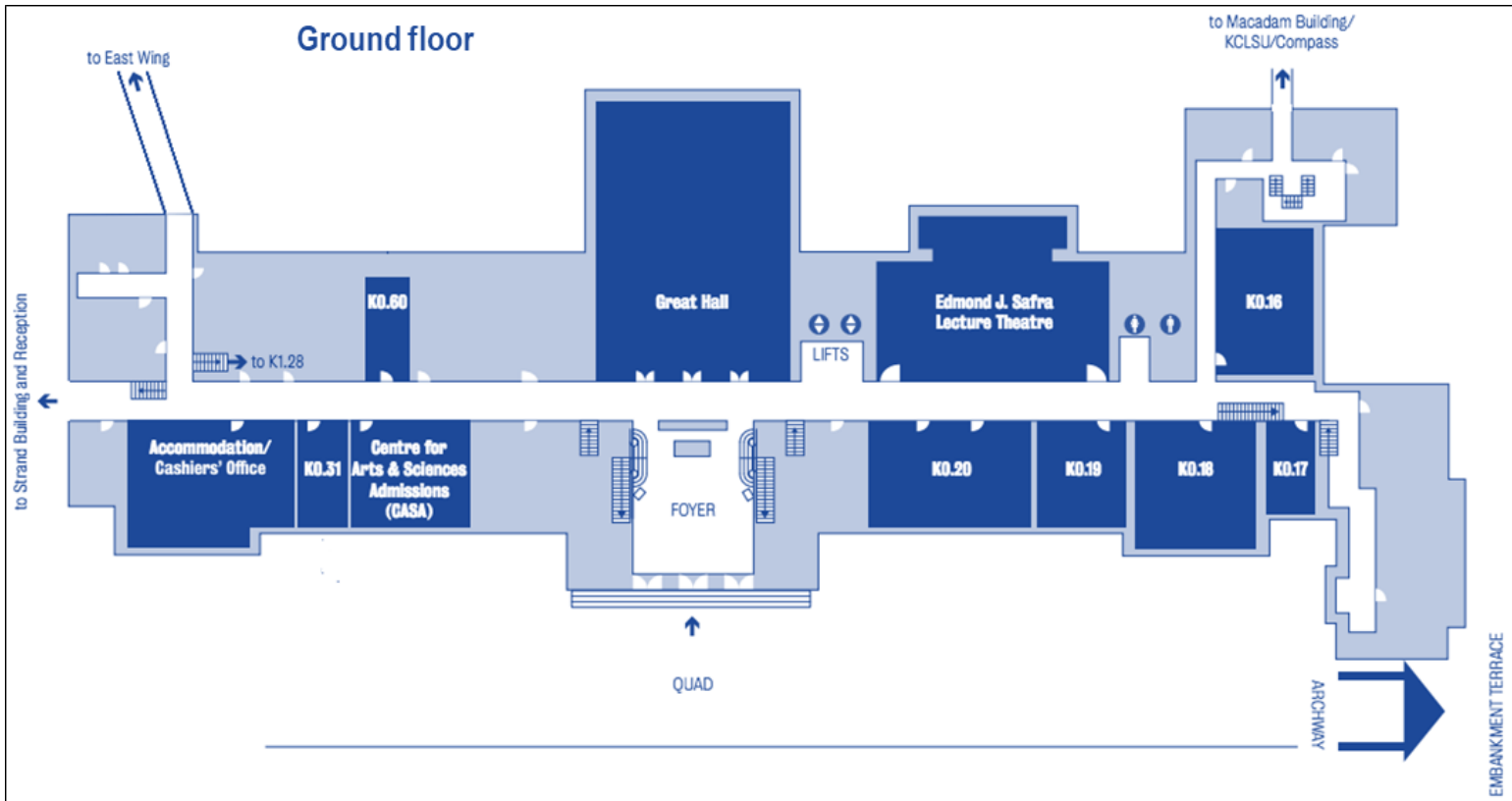
See the enclosed maps for direction.



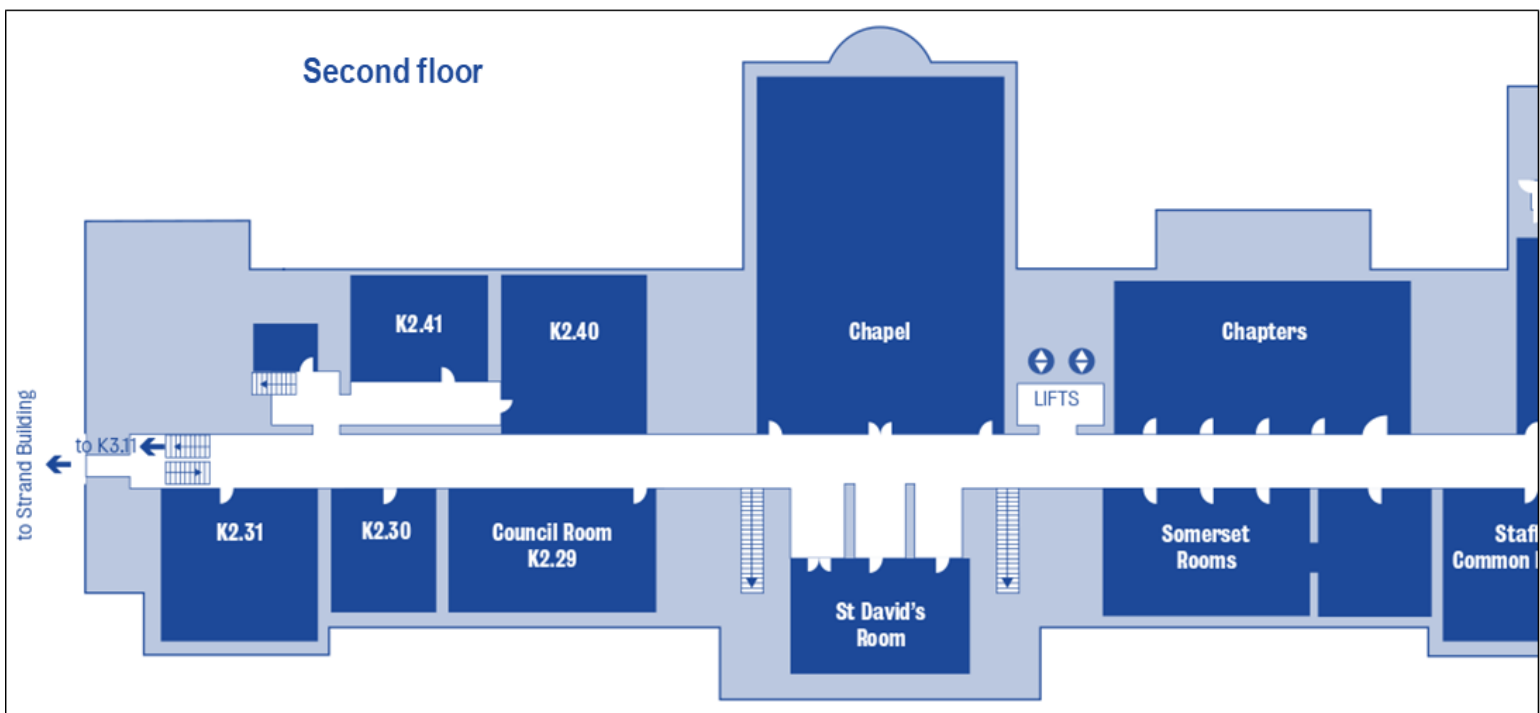
# THE VENUE

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## Ground floor



## Second floor



WiFi **networks** are available for all delegates.

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## About Us

The **School of Biomedical Engineering and Imaging Sciences** (BMEIS) is one of the UK's leading imaging centres consisting of six academic departments: *Cardiovascular Imaging, Cancer Imaging, Imaging Chemistry & Biology, Biomedical Engineering, Perinatal Imaging & Health, and Surgical & Interventional Engineering*. Its cutting-edge research is a result of its highly multidisciplinary approach resulting in rapid development and translation of novel medical imaging technologies into wide clinical areas such as cardiology, cancer, vascular surgery, paediatrics, nuclear medicine and radiology.

The School also prides itself in having strong industrial links with imaging pharmaceutical companies and thus presents exceptional clinical and research facilities.

## Acknowledgements

The organising Committee would like to thank all of the many people who have contributed to the success of this student-led PGR Symposium. Special thanks go to Valeria De Marco, Andreea Podoleanu, Andrew Reader, Enrico De Vita, and especially Michelle Ma for their endless invaluable advice and support.

We are extremely grateful to BMEIS and EPSRC CDT in Smart Medical Imaging for their generosity in funding this event.

## The Organising Committee

Amer Ajanovic, Meghana Kulkarni, Hugh O'Brien, Vasileios Baltatzis, Rian Hendley, Alina Psenichny, Caitlin Hardie, Carlos Cueto Mondejar, Connor Townsend, Truc Pham, Faysal Farah, Melissa Gargaro, Renyang Gu, Jessica Hopson, Kyriaki Kaza, Joseph Hansen-Shearer, Margarita Bintsi, Oeslle De Lucena, Jeremy Birch.

In partnership with the EPSRC CDT in Smart Medical Imaging at King's and Imperial

**Imperial College  
London**

EPSRC Centre for Doctoral Training

**Smart Medical  
Imaging**



Time	Event
10:00	Registration
10:30	Welcome from the School – Prof. Sebastien Ourselin, Head of School Public Engagement Update CDT Update
10:50	Keynote Speaker 1 Prof. Ronald Summers, Bethesda NIH Clinical Center
11:20	Student Oral Presentation Session A
12:20	Poster Session A and Lunch
14:00	Keynote Speaker 2 Dr. Tracy Underwood, University of Manchester
14:30	Student Oral Presentation Session B
15:30	Poster Session B and Refreshments
16:15	Panel Discussion – Multimodal imaging beyond PET/CT: is two better than one? Chair: Prof. Paul Marsden; Panellists: Dr. Isabel Dregely, Prof. Alexander Hammers, Dr Malene Fischer, Dr Sohaib Nazir, Dr Eliana Reyes
16:45	Awards for Best Presentations and Posters
17:00	Drinks and Reception

**Prof. Ronald Summers**

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***Artificial Intelligence in Radiology: Where Does It Stand and Where Is It Going?***

Artificial Intelligence in radiology is going through a boom right now. But it represents just the latest iteration of decades of research in computer-aided detection and diagnosis. In this presentation, I will describe some recent developments in AI for radiology, including advances in automated detection and image segmentation. I will then present some use cases of AI in radiology and describe lessons learned and remaining gaps in knowledge.

**Biosketch:**

Ronald M. Summers received the B.A. degree in physics and the M.D. and Ph.D. degrees in Medicine/Anatomy & Cell Biology from the University of Pennsylvania. He completed a radiology residency at the University of Michigan, Ann Arbor, MI, and an MRI fellowship at Duke University, Durham, NC. In 1994, he joined the Radiology and Imaging Sciences Department at the NIH Clinical Center in Bethesda, MD where he is now a tenured Senior Investigator and Staff Radiologist. He directs the Imaging Biomarkers and Computer-Aided Diagnosis (CAD) Laboratory and is former and founding Chief of the NIH Clinical Image Processing Service. His clinical areas of specialty are thoracic and abdominal radiology and body cross-sectional imaging. His research interests include deep learning, virtual colonoscopy, CAD and development of large radiologic image databases.

His awards include being named a Fellow of the Society of Abdominal Radiologists and of AIMBE and recipient of the Presidential Early Career Award for Scientists and Engineers, the NIH Director's Award, and the NIH Clinical Center Director's Award.

He is a member of the editorial boards of the Journal of Medical Imaging, Radiology: Artificial Intelligence and Academic Radiology and a past member of the editorial board of Radiology. He is a program committee member of the Computer-aided Diagnosis section of the annual SPIE Medical Imaging conference and was co-chair of the entire conference in 2018 and 2019. He was Program Co-Chair of the 2018 IEEE ISBI symposium. He has co-authored over 400 journal, review and conference proceedings articles and is a coinventor on 14 patents.

## Dr. Tracy Underwood

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### *Proton radiobiology and imaging: challenges and opportunities*

High energy proton therapy has revolutionised the treatment of certain tumours, especially amongst paediatric cases. Since 2018, it has been available in the UK. In this talk I will give a brief introduction to proton therapy before focussing on two specific areas: clinical radiobiology and advanced imaging. We'll discuss the differences in radiobiology between photons and protons and various approaches to deal with this. With regards to imaging, we'll consider pre-treatment options to reduce range uncertainty, plus in-room guidance and follow-up imaging.

### **Biosketch**

Dr Tracy Underwood graduated with a Bachelors in Physics from the University of Oxford and an MSc in Medical Engineering and Physics from King's College London. She then completed a DPhil on the dosimetry of small photon beams at the Oxford Institute for Radiation Oncology. The key paper from her DPhil research has been downloaded over 12,000 times and prompted PTW to prototype a new detector: the 'DiodeAir'. She received an MRC Centenary Early Career ('transition to postdoc') Award and was the 2015 winner of the IET/IMEchE prize for the Best Medical Engineering PhD. Funding from the Leverhulme Trust enabled her to pursue post-doctoral research (again on photon dosimetry) in Toulouse, before an EU Marie Curie Fellowship (on proton therapy) took her to Massachusetts General Hospital and Harvard Medical School, followed by University College London.

Since September 2018 Dr Underwood has been a Dean's Prize Research Fellow in the proton therapy group at the University of Manchester. Her primary research interests are proton radiobiology and advanced MR imaging for radiotherapy.

Dr Underwood has two young children and a husband who also works in medical physics research.



# THE PANELLISTS

## Prof. Paul Marsden (Chairman)



Paul is Prof of PET Physics in BMEIS and has been involved in PET imaging for most of his career and has worked in most aspects of the field from the production

of new radionuclides and radiation detectors through to the development of clinical and research scanning protocols. He has a degree in physics from Oxford University, and a PhD in Medical Physics from the Institute of Cancer Research, University of London. His research track record includes the early development of combined PET and MRI imaging systems, data analysis methods for clinical and research PET studies, and development of PET, PET-CT and PET-MR image acquisition and data processing methods. Much of this work is in collaboration with other clinical and scientific researchers at KCL, GSTT and beyond. As Scientific Director at Guy's and St Thomas' PET Centre, Paul is also familiar with the various regulatory, logistical and technical issues associated with performing clinical and research PET studies. He contributes regularly to many PET-related international meetings and committees and is co-lead of the UK PET Core Lab. He is currently recovering from being the general chair of the 2019 IEEE NSS-MIC meeting that took place in Manchester at the end of October

## Prof. Alexander Hammers



Prof Alexander Hammers has been Head of the King's College London & Guy's and St Thomas' PET Centre since 2013. He is Professor (Honorary

Consultant) of Imaging and Neuroscience at King's.

He trained in medicine and then in Neurology in Germany, France, and the UK. He obtained an MD in MR imaging of the hippocampus, and a PhD in PET investigations in focal epilepsy, before leading his own group at the Medical Research Council's Clinical Sciences Centre at Hammersmith Hospital, creating the large manually annotated Hammersmith brain atlas database. As Chair of Excellence in Functional Neuroimaging at the Neurodis Foundation in Lyon, France, 2009-2014, he wrote several of the grants that established France's first simultaneous PET-MR, before joining King's.

Alexander's research areas are functional imaging with PET to understand mechanisms of neurological disease, associated with structural neuroimaging using MRI and anatomical segmentation. In PET, he has evaluated several radioligands including novel ones. The ultimate goal is to benefit individual patients through the clinical application of neuroscience, including through classification and decision support with machine-learning techniques. Methodological work is underpinning all applications, particularly for simultaneous PET-MR



# THE PANELLISTS

## Dr. Malene Fischer



Malene Fischer is a senior clinical lecturer and honorary consultant at the King's College London & Guy's and St Thomas' PET Centre since June 2018 coming from a similar post at Rigshospitalet, University of Copenhagen in Denmark.

Malene is a medical doctor and nuclear medicine specialist. The common thread of her research is the exploration and implementation of hybrid imaging, PET/CT and PET/MR, in diagnosing and treatment of patients with cancer, literally from lab to bed-side including cost-effectiveness analysis. Malene obtained her PhD from the University of Copenhagen exploring the detection limit of the PET/CT technology as well as pioneer clinical studies on PET/CT in staging and therapy evaluation of patients with small cell lung cancer. Her Doctorate (DMSci, an old-fashioned Danish academic degree) was based on the world's first randomized clinical trial on PET/CT in staging of patients with non-small cell lung cancer.

Although based at KCL Malene is PI of a Danish national randomized trial exploring the value of PET/CT and liquid biopsies for surveillance of patients with lung cancer.

A common denominator for her research is multi-disciplinary collaboration and on-going projects include PET/MR for radiotherapy planning and AI-based imaging analysis. Together with colleagues at KCL and Copenhagen Malene is part of HYBRID a Marie Skłodowska-Curie Innovative Training Network and European collaboration under Horizon 2020 on hybrid imaging.

## Dr. Eliana Reyes



Eliana Reyes is a clinician and a lecturer experienced in the use of radionuclide imaging for the evaluation of heart disease. In

particular, she is interested in the use of radionuclide techniques in a multi-modality imaging approach to study 1) myocardial perfusion under physiological conditions and disease, as well as the changes that may take place as a result of disease progression and/or intervention; 2) myocardial inflammation in infiltrative disorders and infection, as well as a manifestation of cardiotoxicity. Eliana joined King's in 2016 and currently works at the PET imaging centre. Before joining King's, she contributed to teaching and learning on cardiovascular sciences and PBL for over 15 years at Imperial College London, where she was awarded a PhD in Medicine in 2010. She also works as a nuclear cardiologist at the Royal Brompton and Harefield NHS Foundation Trust, and she is the founder and CEO of a venture aimed to improve patient experience using intelligent digital technology. Eliana contributes to postgraduate teaching both nationally and internationally and has several publications in the field of nuclear cardiology. She is also keen on encouraging girls and young women to enrol in scientific disciplines by offering opportunities for shadowing and tutoring at her workplace.

# THE PANELLISTS

## Dr. Sohaib Nazir

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Sohaib Nazir is a NIHR academic clinical lecturer and cardiology registrar at King's College London and Guy's and St Thomas' Hospital. He undertook a PhD at King's College

London in Cardiac PET-MR imaging. His passion lies with cross sectional imaging with CT, CMR and PET, particularly for the assessment of coronary artery disease. In particular, he has an interest in coronary imaging, myocardial perfusion and novel PET tracers. These emerging techniques require validation prior to implementation into clinical routine, and he is currently leading on several research studies for the evaluation of these novel techniques, for which he hopes will lead to improved diagnostic tools and benefit for patients.

## Dr. Isabel Dregely

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Isabel Dregely is a lecturer in MRI Physics in BMEIS. Her research interest is in using imaging to improve diagnosis and therapy planning in cancer patients. She uses computer

simulations, an understanding of MRI signal models and interaction in healthy and cancer tissue to efficiently acquire and accurately extract 'functional' information from imaging data to better characterize each patient's cancer.

Before joining King's in 2015, she studied physics in Germany, and held research posts in USA (University of New Hampshire, Harvard, University of Virginia and University of California Los Angeles) and Germany (Technical University Munich) in many aspects of MRI research: instrumentation (designing and building RF coils), MR physics, image acquisition including pulse programming, reconstruction, quantitative and multi-parametric post-processing, novel contrast agents (hyperpolarised Xenon) and physiological modelling. As a post-doc in Munich, she worked with the worldwide first installed human whole-body simultaneous PET/MR machine.

# ORAL PRESENTATION A

<b>11:20-11:30</b>	<b>Reuben Dorent</b>	Learning Joint Segmentation Of Tissues And Brain Lesions From Task-Specific, Hetero-Modal, Data-Shifted Datasets
<b>11:30-11:40</b>	<b>Sophie Morse</b>	Focused Ultrasound And Microbubbles Get Drugs Into The Brain Efficiently And Safety In Vivo
<b>11:40-11:50</b>	<b>Sarah Mcelroy</b>	Simultaneous Multi-Slice bSSFP And Compressed Sensing For Myocardial Perfusion Imaging With High Spatial Resolution And Coverage
<b>11:50-12:00</b>	<b>George Keeling</b>	[ <sup>68</sup> Ga]Ga-THP-Pam: A Bone-Targeting PET Agent With Rapid Radiolabelling
<b>12:00-12:10</b>	<b>Dana Kanel</b>	Neonatal White Matter Microstructure And Emotional Development During The Pre-School Years In Children Who Were Born Very Preterm
<b>12:10-12:20</b>	<b>Hannah Perry</b>	Multi-Gadolinium Agents For Contrast Enhancement In Magnetic Resonance Imaging

# ORAL PRESENTATION B

<b>14:30-14:40</b>	<b>Marina Strocchi</b>	A Virtual Cohort of Heart Failure Patients Four-chamber Heart Meshes for Cardiac Electro-mechanics Simulations
<b>14:40-14:50</b>	<b>Christopher Thomas</b>	Effect Of Bulk Density And Neural Network Voxel-Based Pseudot Methods On Dose-Derived Rectal Toxicity Prediction In MR-Only Prostate RT
<b>14:50-15:00</b>	<b>Emma Burnhope</b>	Resonance Elastography – A Novel Imaging Biomarker For Evaluating Patients At Risk Of Heart Failure With Preserved Ejection Fraction (HFpEF)
<b>15:00-15:10</b>	<b>Truc Pham</b>	An Iodine-124 Based Dual Positron Emission Tomography and Fluorescent Labelling Reagent for <i>In vivo</i> Cell Tracking
<b>15:10-15:20</b>	<b>Tianrui Zhao</b>	Towards A Photoacoustic Endo-Microscopy Imaging Probe

# POSTER SESSION A

<b>PA01</b>	<b>Alina Psenicny</b>	Towards a Simultaneous Multicontrast PET-MR Sequence for Comprehensive Assessment of Cardiac Sarcoidosis
<b>PA02</b>	<b>Ingebjørg N. Hungnes</b>	A New Biocompatible Diphosphine-peptide Chelator: Attaching Peptides to Radioactive $^{99m}\text{Tc(V)}$ for Targeted SPECT Imaging of Disease
<b>PA03</b>	<b>Meghana Kulkarni</b>	$^{18}\text{F}$ -Choline and $^{68}\text{Ga}$ -THP-PSMA Simultaneous PET/MRI for the Primary Staging of Prostate Cancer
<b>PA04</b>	<b>Daniel J. West</b>	Generation Of “Inhomogeneous” MT Contrast Using Multiband Pulses.
<b>PA05</b>	<b>Christopher Davis</b>	An Indirect Labelling Approach to Track The Therapeutic CAR T-Cells with Dual PET and Fluorescence Imaging
<b>PA06</b>	<b>Afnan Malaih</b>	Assessment Methods for Healthy Tissue Metabolism in a Sub-Group of Advanced Classical Hodgkin Lymphoma Patients Using FDG-PET/CT Imaging
<b>PA07</b>	<b>Reza Hajhosseiny</b>	Improved Image Quality And Scan Efficiency Using Image-Navigated And Accelerated High-Resolution 3D Whole-Heart Coronary CMR Angiography (CMRA) In Patients With Suspected Coronary Artery Disease
<b>PA08</b>	<b>Aishwarya Mishra</b>	A Tris(hydroxypyridinone)-phospholipid Conjugate for Pretargeted PET Imaging of Liposomal Nanomedicines
<b>PA09</b>	<b>Milou van Poppel</b>	Antenatal Prediction of Coarctation Of The Aorta Using Fetal CMR
<b>PA10</b>	<b>Emily M. Chan</b>	Transfer Learning for Characterising Liver Fibrosis in T1-mapping
<b>PA11</b>	<b>Azalea Khan</b>	Developing A Direct Radiolabelling Method To Track Exosomes Using PET Imaging
<b>PA12</b>	<b>Harminder Gill</b>	Bicuspid Aortic Valve Phantom Has Comparable Haemodynamics And 4D Flow Characteristics To A Bicuspid Aortic Valve <i>In Vivo</i>
<b>PA13</b>	<b>Giorgia Milotta</b>	3D Whole-heart High-resolution Motion Compensated Joint T1/T2 Mapping and CMRA
<b>PA14</b>	<b>Bradley Edward Osborne</b>	Development of a Series of Triarylphosphonium-Functionalised NODAGA Ligands for Gallium-68 Chelation and Biological Evaluation

# POSTER SESSION A

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<b>PA15</b>	<b>Johannes Steinweg</b>	Assessment of the Fetal Circulation in Congenital Heart disease with Magnetic Resonance Imaging
<b>PA16</b>	<b>Matthieu Ruthven</b>	Development Of Methods To Create Dynamic Three-Dimensional Subject-Specific Computer Models Of The Vocal Tract During Speech
<b>PA17</b>	<b>Fraser Graeme Edgar</b>	Nanoscale Microfluidic Reactions: Towards Stoichiometric Carbon-11 Radiolabelling For PET
<b>PA18</b>	<b>Julie Sigurdardottir</b>	Tractography Of The Neonatal Hypothalamic Afferent And Efferent White-Matter Bundles In Exploring The Effects Of Exposure To Maternal Obesity And Gestational Diabetes <i>In Utero</i> , An Investigation From The Developing Human Connectome Project.
<b>PA19</b>	<b>Olivier Jaubert</b>	Liver MR Fingerprinting: T1, T2, T2* And Fat Fraction Tissue Characterization
<b>PA20</b>	<b>Ines M. Costa</b>	The Radiobiological Effectiveness Of The Auger Electron-Emitter <sup>99m</sup> Tc
<b>PA21</b>	<b>Amer Ajanovic</b>	Matlab-Implementation of Magnetic Resonance Green's Functions in Accelerated Integral Equation Methods for Electromagnetic Fields' Computation in Ultra High Field Magnetic Resonance Imaging
<b>PA22</b>	<b>Sofia Monaci</b>	Comparison Of 12-Leads ECG Signals During VT Episodes From 3D Torso Models In Presence Of Different Ventricular Infarcts Anatomies
<b>PA23</b>	<b>Jordan Cheng</b>	Radiobiology For Molecular Radionuclide Therapy: A Necessity For Improving Current Cancer Radiotherapeutics
<b>PA24</b>	<b>Caitlin Hardie</b>	MR Perfusion Imaging of the Fetal Brain Using Velocity-Selective Arterial Spin Labeling (VSASL)
<b>PA25</b>	<b>Katarzyna Osytek</b>	Investigating The Radiotoxicity Of Thallium-201: DNA Damage And Tumour Cell Killing Effect In Breast And Prostate Cancer Cells.

# POSTER SESSION B

<b>PB01</b>	<b>Cristobal Rodero</b>	The Role Of Cardiac Anatomy In Multipolar Lead Design Optimisation For Cardiac Resynchronization Therapy
<b>PB02</b>	<b>Tamzin Bond</b>	Imaging And Sensing In Living Cells Using Dual Modality Fluorescent-PET Imaging Agents
<b>PB03</b>	<b>Tahani Omar Alkahtani</b>	Optimising Molecular Radionuclide Therapy: The Role Of SPECT/CT & PET/CT Quantitation And Radiation Dosimetry
<b>PB04</b>	<b>David Leitão</b>	What Method Is More Efficient For T1 And T2 Mapping?
<b>PB05</b>	<b>Afnan Darwesh</b>	In Vivo Trafficking Of The Anti-Cancer Drug [Ga(Oxinate) <sub>3</sub> ] (KP46) Studied With Gallium-68 PET Imaging
<b>PB06</b>	<b>Daniel J. Hughes</b>	Pecan Study. Imaging PD-L1 In Cancer: A Tool For Measuring Response To Immunotherapy?
<b>PB07</b>	<b>Elsa-Marie Otoo</b>	VR Model Viewer To Visualise And Assemble Medical Images And Segmented Models
<b>PB08</b>	<b>Alex C Rigby</b>	Thallium-201 As A Candidate For Targeted Radionuclide Therapy: Chemistry And DNA Damaging Potential
<b>PB09</b>	<b>Daniel O'Hare</b>	Non-Invasive Measurement Of Atrial Conduction Velocity During Exercise
<b>PB10</b>	<b>Lamis Jada</b>	Dark-Blood Late-Enhancement Cardiovascular Magnetic Resonance Imaging In Arrhythmogenic Right Ventricular Cardiomyopathy
<b>PB11</b>	<b>Benjamin Grimsdell</b>	In Vivo Tracking Of Cardiac Progenitor Cells Following Acute Myocardial Infarction
<b>PB12</b>	<b>Woo-Jin Cho</b>	Analysis And Improvement Of Simpson's Rule For Left-Ventricle Volume Estimation In 2DE
<b>PB13</b>	<b>Oeslle Lucena</b>	Convolutional Neural Networks For Fiber Orientation Distribution Enhancement To Improve Single-Shell Diffusion MRI Tractography
<b>PB14</b>	<b>Eman Khalil</b>	Imaging Nrf2: Master Regulator Of Tumour Antioxidant Response



# POSTER SESSION B

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<b>PB15</b>	<b>Russell Macleod</b>	Neonatal 2D Slice Structural MRI Abnormality Detection Using Gaussian Processes
<b>PB16</b>	<b>Federico Luzi</b>	Rapid, One-Pot Radiosynthesis Of [Carbonyl- <sup>11</sup> C]Formamides From Primary Amines And [ <sup>11</sup> C]CO <sub>2</sub>
<b>PB17</b>	<b>Irina Grigorescu</b>	Interpretable Convolutional Neural Networks For Preterm Birth Classification
<b>PB18</b>	<b>Joanna Bartnicka</b>	The Effect Of L-Cysteine On <sup>64</sup> Cu Accumulation In Cancer Cells
<b>PB19</b>	<b>Rebecca H. Kay</b>	Three-Dimensional Ultrasound For Quantifying Lateral Hip Displacement In Children With Cerebral Palsy: A Validation Study
<b>PB20</b>	<b>Madeleine Iafrate</b>	Preliminary Evaluation Of Chelating Agents For Biomolecular Labelling With The Long-Lived PET Isotope Manganese-52
<b>PB21</b>	<b>Samuel Budd</b>	Confident Head Circumference Measurement From Ultrasound With Real-Time Feedback For Sonographers
<b>PB22</b>	<b>Megan O. Midson</b>	Dual-Modal Imaging Agents Based Upon Superparamagnetic Iron Oxide And Upconversion Nanoparticles
<b>PB23</b>	<b>Weiwei Jin</b>	Why Flow Mediated Dilation Fails To Assess True Endothelial Cell Function? A Computational Based Investigation
<b>PB24</b>	<b>Rian Hendley</b>	Towards Imaging Endogenous CO In Mitochondria Using Fluorescent Ruthenium(II) Imaging Agents
<b>PB25</b>	<b>Jeremy Birch</b>	Development Of New Visual Inertial Instrument Tracking System For Vitreoretinal Surgery
<b>PB26</b>	<b>Saul Cooper</b>	Tripodal, N-Centred Phosphine Ligands: Towards A Novel Donor Set For <sup>99m</sup> Tc Radiopharmaceutical Formulation