US-UK scientific forum
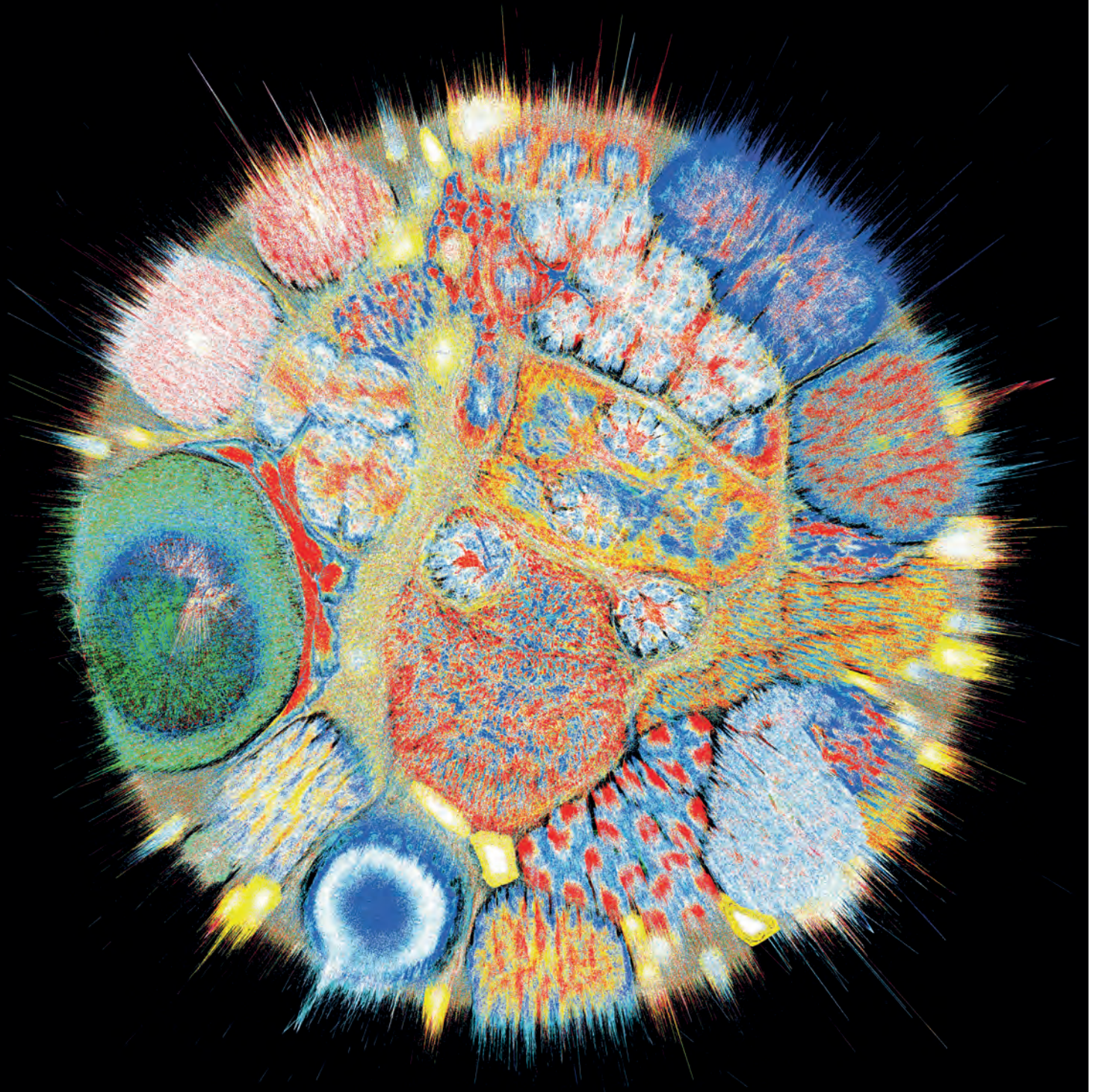# Science in the age of AI

11 – 12 June 2024

THE
ROYAL
SOCIETY

NATIONAL ACADEMY OF SCIENCES

Accessibility

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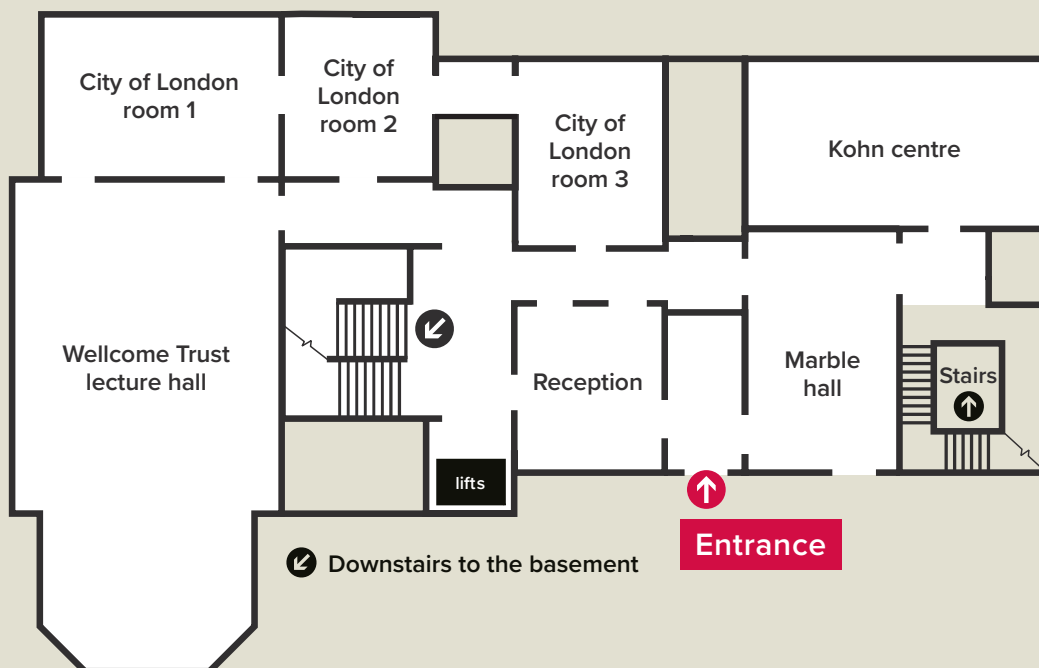
Our lecture hall is fitted with an induction loop for those who are hard of hearing.

Fire alarm

If you hear the fire alarm at any time, it is not a test. Please calmly leave the lecture hall through your nearest fire exit.

Ground floor
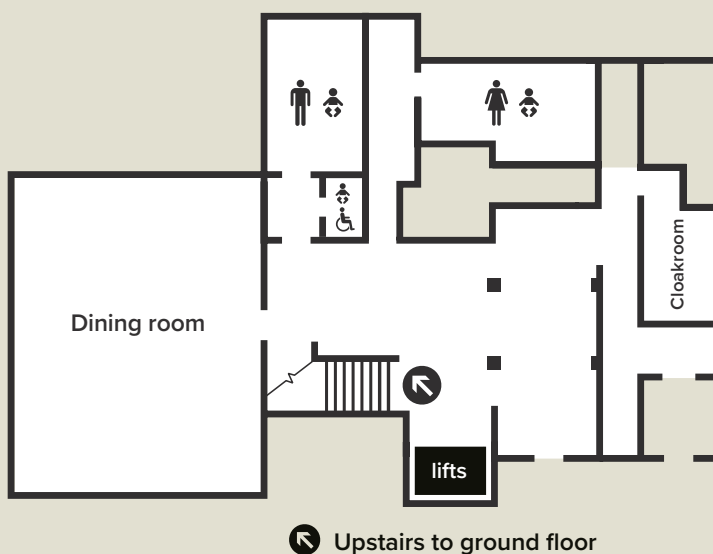
City of London room 1

City of London room 2

City of London room 3

Kohn centre

Wellcome Trust lecture hall

Reception

Marble hall

Stairs

lifts

Downstairs to the basement

Entrance

Basement

Dining room

Cloakroom

lifts

Upstairs to ground floor

Contents

The Royal Society

The Royal Society is a Fellowship of the world's most distinguished scientists. Its mission is to recognise and support excellent science and to encourage the development and use of science for the benefit of humanity and the good of the planet. It was founded in 1660 and received a Royal Charter from King Charles II. It is the oldest scientific academy in continuous existence and has several roles: it is the national academy of science for the UK, a science journal publisher, a learned society and a funding agency. It also provides science advice to policymakers and advises on science education.

The Royal Society has had a hand in some of the most innovative and life changing discoveries in scientific history. It supports the UK's best and brightest young scientists, engineers and technologists, influences science policy, debates scientific issues with the public and much more.

Fellows of the Royal Society

The Society's foundation is its Fellowship, which is made up of over 1700 of the most eminent scientists, engineers and technologists from the UK and the Commonwealth, as well as more than 200 Foreign Members from around the world. The Fellowship includes 85 Nobel Laureates. The President of the Royal Society is Sir Adrian Smith.

Our Fellows and Foreign Members, are elected for life on the basis of scientific excellence and have included:

- o Isaac Newton
- o Charles Darwin
- o Albert Einstein
- o Stephen Hawking
- o Dorothy Hodgkin

Funding

Through its research fellowships and funding programmes, the Royal Society works in partnership with universities and industry, to invest in more than 1600 scientists. Our support ranges from early career fellowships to senior professorships and grants ranging from international exchanges to travel and equipment grants. Our international grants programme enables high calibre scientists to initiate collaborations and exchange ideas with the world's leading researchers.

Science Policy and international work

The Science Policy Centre undertakes a range of activities to ensure that the Royal Society is one of the world's most influential and authoritative sources of scientific advice. Its work covers five broad themes: research innovation, wellbeing, data, resilience and emerging technologies, and education.

International engagement has always been an integral part of the Royal Society's mission. Our international work encourages global cooperation on science policy, promotes individual and institutional scientific capacity building in developing countries, and supports international scientific collaboration.

Education

The Society's interest in education stems from a belief that knowledge of science and mathematics are important for an individual's success in life. Our unique position in the science community, combined with an excellent reputation in the education community, means that we can provide influential, unique policy advice, and support activities that bring together the best of science and education for the future of young people.

Science communication

The Society's innovative programme of inspirational activities helps us reach a wider audience. Our annual Summer Science Exhibition comprises competitively selected exhibits with plentiful hands-on and interactive participation, giving visitors the opportunity to talk to the scientists behind the work.

The Society's Scientific Programme brings scientists from around the work to present and discuss new research in rapidly developing areas of science across all disciplines. Our scientific meetings are organised by key thought leaders and have been held at the Society for most of our history.

Publishing

Since 1665 when the Society started the world's first science journal, *Philosophical Transactions*, it has been publishing cutting-edge research across the entire range of science. Today there are ten peer-reviewed journals publishing 3,000 articles per year from researchers around the world. Two journals are fully open access and the remainder are making a transition to open access over the next few years.

Centre for History of Science

 An extraordinary and unrivalled record of the development of science that spans nearly 350 years, the Society's Centre for the History of Science is home to our unique archives. It also focuses on widening access to our collections through the online presentation of digitised heritage material, lectures and conferences.

For more information on any of our activities, please visit our website: royalsociety.org

The National Academy of Sciences, NAS

The National Academy of Sciences (NAS) is a private, non-profit society of distinguished scholars. Established by an Act of Congress, signed by President Abraham Lincoln in 1863, the NAS is charged with providing independent, objective advice to the nation on matters related to science and technology. Scientists are elected by their peers to membership in the NAS for outstanding contributions to research. The NAS is committed to furthering science in America, and its members are active contributors to the international scientific community. Nearly 500 members of the NAS have won Nobel Prizes, and the Proceedings of the National Academy of Sciences, founded in 1914, is today one of the premier international journals publishing the results of original research.

The National Academy of Engineering (NAE) and the National Academy of Medicine (NAM, formerly the Institute of Medicine) were founded under the NAS charter in 1964 and 1970, respectively. The three Academies work together as the National Academies of Sciences, Engineering, and Medicine to provide independent, objective analysis and advice to the nation and conduct other activities to solve complex problems and inform public policy decisions. The National Academies also encourage education and research, recognize outstanding contributions to knowledge, and increase public understanding in matters of science, engineering, and medicine. The National Academies' service to government has become so essential that Congress and the White House have issued legislation and executive orders over the years that reaffirm its unique role.

Members are elected to the National Academy of Sciences in recognition of their distinguished and continuing achievements in original research. Membership is a widely accepted mark of excellence in science and is considered one of the highest honors that a scientist can receive. Current NAS membership totals approximately 2,400 members and 500 international members, of which approximately 190 have received Nobel prizes.

For more information on the mission, history, and current projects and activities of the NAS please visit our website: nasonline.org

Pre meeting – Monday 10 June 2024	
19.00	Welcome dinner at **One Great George Street**

Day 1 – Tuesday 11 June 2024	
08.00	Coffee
08.30	Forum opening remarks
	Session 1: The Emergence of AI Science to Support Scientific Research
08.50	Opening remarks from Professor Andy Cooper
09.00	Presentation from Professor Jeannette M Wing
09.15	Presentation from Dr Frank Noé
09.30	Presentation from Dr Pushmeet Kohli
09.45	Presentation from Professor Tom Mitchell
10.00	Panel discussion
10.20	Breakout groups
10.50	Plenary
11.00	Coffee
	Session 2: AI at the Frontier of Scientific Discovery: Transformative Applications Across Disciplines
11.15	Opening remarks from Dr Tapio Schneider
11.25	Presentation from Professor Alexander Szalay
11.40	Presentation from Professor Kristin Persson
11.55	Presentation from Professor Kim Jelfs
12.10	Presentation from Dr Rémi Lam
12.25	Presentation from Professor Anil Madhavapeddy
12.40	Panel discussion
1.00	Breakout groups
1.30	Plenary
1.40	Lunch
	Session 3: Scientific Advances powered by AI, and New Science Enabled by AI
2.30	Opening remarks from Dr David Donoho
2.40	Presentation from Dr John Jumper
2.55	Presentation from Professor John Moult
3.10	Presentation from Dr Jonathon Phillips
3.25	Presentation from Professor Caroline Uhler
3.40	Presentation from Professor Andrew Zisserman
3.55	Panel discussion
4.15	Breakout groups
4.45	Plenary
5.00	Close of day 1, drinks reception
6.00	**Dinner**

Day 2 – Wednesday 12 June 2024	
08.30	Coffee
	Session 4: Enabling Open Science, Reproducibility, Replicability, and Privacy
09.00	Opening remarks from Professor Chris Holmes
09.10	Presentation from Professor Victoria Stodden
09.25	Presentation from Dr Sasha Luccioni
09.40	Presentation from Professor Mark Kelson
09.55	Presentation from Dr Xiaoxuan Liu
10.10	Presentation from Dr Rebecca Lawrence
10.25	Panel discussion
10.45	Breakout groups
11.15	Plenary
11.25	Coffee
	Session 5: Panel on Recent Publications
11.40	Chaired by Professor Alison Noble
12.30	Lunch
	Session 6: Responsible AI in Science
1.15	Opening remarks from Professor William Press
1.25	Presentation from Dr Yolanda Gil
1.40	Presentation from Dr Stuart Feldman
1.55	Presentation from Professor David Leslie
2.10	Presentation from Professor Shannon Vallor
2.25	Presentation from Lord Martin Rees
2.40	Panel discussion
3.00	Breakout groups
15.30	Plenary
15.40	Forum closing remarks
15.50	Forum adjourns

Meeting day 1 – Tuesday 11 June 2024

8.30am Opening remarks

Sir Adrian Smith PRS
The Royal Society

Adrian Smith became President of the Royal Society on 30 November 2020. He is a mathematician with expertise in Bayesian statistics. This branch of mathematics represents uncertainties in the form of probabilities, which are then modified through the mechanism of Bayes theorem as new information becomes available. Adrian's comprehensive publications on diverse areas of Bayesian statistics have had a major impact on statistical practice in a wide range of disciplines and application areas.

Between 2008 – 2012, he was Director General, Knowledge and Innovation in BIS (subsequently BEIS) and has previously worked with the UK Higher Education Funding and Research Councils. Between 2018 – 2023 he was Institute Director and Chief Executive of The Alan Turing Institute. Adrian is Chair of the Board of the Diamond Light Source and was also a board member of the UK Atomic Energy Authority between 2017 – 2023.

In 2017, he carried out a review of the maths curriculum for 16-18 year olds for the Treasury and Department for Education. In the 2011 New Year Honours list, he was awarded the title of Knight Bachelor.

Professor Alison Noble CBE FrEng FRS
University of Oxford & The Royal Society
Forum Co-chair

Professor Alison Noble CBE FREng FRS is currently the Technikos Professor of Biomedical Engineering at the University of Oxford and a Vice President and a Foreign Secretary of the Royal Society.

Alison is a biomedical engineer and has worked in industry and academia. Her academic research interests are at the inter-disciplinary interface of artificial intelligence (computer vision) and healthcare imaging. She has worked with clinical partners in the UK, India, and Africa on translational AI-based imaging science, and commercialised some of her group's research via a spinout company. A former ERC Advanced Grant recipient (2016-23), Alison was awarded a UKRI Turing AI World-Leader Researcher Fellowship themed around human-AI collaboration in healthcare imaging in 2023.

Alison was elected a Fellow of the Royal Society in 2017 and was awarded the Royal Society Gabor Medal in 2019. She has chaired Royal Society data policy working groups leading to policy reports on *Protecting privacy in practice* (2019), *From privacy to partnership* (2023) and most recently *Science in the age of AI* (May 2024).

Alison received an OBE in 2013 and was awarded her CBE in the 2023 King's Birthday Honours List.

Professor William Press NAS
University of Texas at Austin & National Academy of Sciences
Forum Co-chair

William H Press is a computer scientist and computational biologist with broad interests in the physical and biological sciences. He has been a manager in both university and national laboratory settings and is widely recognised for his academic and research accomplishments. Press is the Leslie Surginer Professor of Computer Science and Integrative Biology at the University of Texas at Austin. He is also a Senior Fellow (emeritus) at the Los Alamos National Laboratory. From 2009 to 2017, Press was a member of President Obama's Council of Advisors on Science and Technology (PCAST) and was reappointed to this White House council by President Biden in 2021. He is a past (2012 to 2013) president of the American Association for the Advancement of Science. He is currently the elected Treasurer of the National Academy of Sciences and is a member of the Governing Board of the National Research Council.

Meeting day 1 – Tuesday 11 June 2024

8.50am Session 1: The Emergence of AI Science to Support Scientific Research

This session will lay foundations for the forum, discussing the current state of AI as a discipline and how AI can be integrated into scientific research.

Chair: Professor Andy Cooper FRS
University of Liverpool

Andy Cooper led the bid to establish the Materials Innovation Factory (MIF) via the UK Research Partnerships Infrastructure Fund and he is its first Academic Director. He is also the Director of the £10 M Leverhulme Centre for Functional Materials Design. His main research interests are organic materials, supramolecular chemistry, and materials for energy production and molecular separation. This is underpinned by a strong technical interest in high-throughput methods and robotics. A unifying theme in his research is the close fusion of computational prediction and experiment to discover new materials with step-change properties. Also, he is the Co-Director, EPSRC Hub in AI for Chemistry (AIChemy). He was awarded the Cheetham Lecture Award by University of Santa Barbara and Royal Society University Professor in 2023.

9.00am AI in Science

Professor Jeannette M Wing
Columbia University

Jeannette M Wing is the Executive Vice President for Research and Professor of Computer Science at Columbia University. Prior to joining Columbia in 2017, she was Corporate Vice President of Microsoft Research, had been on the faculty at Carnegie Mellon University since 1985, and served as the Assistant Director of the Computer and Information Science and Engineering Directorate at the National Science Foundation. She received her SB, SM, and PhD degrees in Computer Science, all from the Massachusetts Institute of Technology. She is a Fellow of the American Academy of Arts and Sciences, American Association for the Advancement of Science, Association for Computing Machinery, Institute of Electrical and Electronic Engineers, and National Academy of Innovators. She is a member of the National Academy of Engineering. She holds an honorary Doctor of Technology from Linkoping University, Sweden. Her current research focus is on trustworthy AI.

9.15am AI for the Molecular Sciences

Dr Frank Noé
Microsoft Research

Frank has done undergraduate studies in Electrical Engineering and Computer Science and a PhD in Biophysics at University of Heidelberg. In 2007 he started a group leader position at FU Berlin where he was tenured as professor in 2013. Since 2022, Frank is Partner in the Microsoft Research AI for Science Lab, leading a newly founded team out of Berlin. Frank has received two European Research Council awards and the early-career award in Theoretical Chemistry of the American Chemical Society. He is an ISI highly cited scientist, a fellow of the European Laboratory for Learning and Intelligent Systems, and a member of the Berlin-Brandenburg Academy of Sciences. Frank's research focuses on Artificial Intelligence for the Sciences.

9.30am Accelerating Science with AI

Dr Pushmeet Kohli
Google DeepMind

Pushmeet Kohli, Vice President of Research (AI for Science & Safety, Reliability and Security) leads the science program at Google DeepMind, which uses AI to help accelerate scientific progress in areas ranging from genomics to quantum chemistry.

Pushmeet's team is responsible for AlphaFold, an AI system for predicting the 3D structure of proteins. The AlphaFold paper is one of most cited AI biology papers ever, with over 15,000 citations. His team is also working on AI systems for materials discovery and nuclear fusion.

Before working at Google DeepMind, Pushmeet spent 10 years in research for Microsoft, rising to the director of research at Microsoft's Cognition group. Pushmeet has won a number of awards including the British Machine Vision Association's "Sullivan Doctoral Thesis Award", and is a member of the Association for Computing Machinery's (ACM) Distinguished Speaker Program.

He also leads research to ensure AI systems are safe, and was the UK government's nominee for the Responsible AI working group as part of the Global partnership on AI.

9.45am The Future of Human Learning Science

Professor Tom Mitchell
Carnegie Mellon University

Tom M Mitchell is the Founders University Professor at Carnegie Mellon University, where he founded the world's first Machine Learning Department. His research interests include machine learning, artificial intelligence, cognitive neuroscience, and the impact of AI on society. A current focus is on AI to improve online education, where his research has been deployed to computer learning environments that serve millions of students. Mitchell has testified to a variety of US congressional committees regarding potential uses and impacts of artificial intelligence. He is currently co-chairs a US National Academies study on AI and the future of work, and currently chairs a task force studying Generative AI for the Special Competitive Studies Project. Mitchell is an elected member of the US National Academy of Engineering, and the American Academy of Arts and Sciences, and a Fellow and Past President of the Association for the Advancement of Artificial Intelligence (AAAI).

10.00am Panel discussion

10.20am Breakout groups

10.50am Plenary

11.00am Coffee break

11.15am Session 2: AI at the Frontier of Scientific Discovery: Transformative Applications Across Disciplines

This session will explore pioneering case studies demonstrating the application of AI across scientific disciplines, including astronomy, materials science, and weather forecasting. We will explore how AI is transforming the landscape of scientific discovery, highlighting its potential and examining its limitations.

Chair: Dr Tapio Schneider
California Institute of Technology

Tapio Schneider is the Theodore Y. Wu Professor of Environmental Science and Engineering at Caltech and a Principal Scientist at Google. His research focuses on understanding how the climate of Earth and other planets comes about and evolves in response to changes, for example, in greenhouse gas concentrations or planetary orbits. To improve climate predictions, he leads the Climate Modeling Alliance (CliMA), which is developing a next-generation climate model using AI tools to combine observations with process-based models of the Earth system. He has been recognised as one of the "Top 20 Scientists under 40" by *Discover Magazine*, was a David and Lucile Packard Fellow and Alfred P. Sloan Research Fellow, and has received the Rosenstiel Award from the University of Miami and the James R. Holton Award from the American Geophysical Union, where he is also an elected fellow.

11.25am Sensors to Tensors

Professor Alexander Szalay NAS
Johns Hopkins University

Alexander Szalay is Bloomberg Professor at the Johns Hopkins University, the Director of the Institute for Data Intensive Science. He is a cosmologist, working on Big Data. He architected the archive of the Sloan Digital Sky Survey. He is a Corresponding Member of the Hungarian Academy of Sciences, and a Fellow of the American Academy of Arts and Sciences. In 2023 he has been elected to the US National Academy of Sciences and as a Fellow of the ACM. In 2015 he received the IEEE Fernbach Award for his work on Data Intensive Computing. In 2020 he was awarded the Ambartsumyan Prize for his work in Physical Cosmology. In 2021 his team received the ACM SIGMOD Systems prize for their work on the SDSS Archive. In 2021 he was one of the winners of the International Falling Walls Prize in Life Sciences for his work on cancer.

11.40am Materials Data: Fuelling the AI Revolution

Professor Kristin Persson
University of California, Berkeley

Kristin Persson is the Daniel M. Tellep Distinguished Professor at the University of California, Berkeley and the Director of the Molecular Foundry, a user facility at Lawrence Berkeley National Lab. She is also the Director and founder of the Materials Project (materialsproject.org) which is a world-leading resource for materials data and design. She has received the DOE Secretary of Energy's Achievement Award twice, the TMS Cyril Stanley Smith Award, the TMS Faculty Early Career Award, the Falling Walls Science and Innovation Management Award, the LBNL Director's award for Exceptional Scientific Achievement and she is a member of the Royal Swedish Academy of Science, an MRS Fellow, an AAAS Fellow and an APS Fellow. She holds several patents in the clean energy space and has co-authored more than 300 peer-reviewed publications.

11.55am Computational Chemistry and AI – What We Can Contribute and What We Need to Accelerate Chemical Discovery

Professor Kim Jelfs
Imperial College London

Professor Kim Jelfs is a Professor in the Department of Chemistry at Imperial College. Her group specialises in the use of computer simulations and artificial intelligence to assist in the discovery of supramolecular materials, particularly porous materials, and organic electronics. She is Director of Imperial's Institute for Digital Molecular Design and Fabrication (DigiFAB) and co-PI for the EPSRC AI Hub for Chemistry, Alchemy.

12.10am Learning Global Weather Forecasting from Data

Dr Rémi Lam
Google DeepMind

Rémi Lam is a Staff Research Scientist at Google DeepMind working on making weather forecasting faster and more accurate. His research leverages machine learning techniques such as adversarial neural networks, graph neural networks and diffusion models to design tools for precipitation nowcasting (DGMR) and global medium range weather prediction (GraphCast).

Prior to joining Google DeepMind, Remi completed his PhD at MIT in the AeroAstro department, advised by Karen Willcox.

12.25pm Balancing the Opportunity Cost of Land Use Change Across Wildlife and Human Needs

Professor Anil Madhavapeddy
University of Cambridge

Professor Anil Madhavapeddy co-founded the Environment and Energy Group at the University of Cambridge Computer Science department, where he researches global-scale computation and sensing for environmental conservation. He also holds an appointment at the Cambridge Conservation Initiative, where he directs the Cambridge Centre for Carbon Credits (4C) and collaborates with NGOs such as the RSPB, BirdLife, UNEP-WCMC and IUCN on tropical forest health and biodiversity. Madhavapeddy is a long-time maintainer on widely deployed and infrastructure-critical open-source projects such as Docker, OpenBSD, OCaml, and Xen, and a seasoned entrepreneur who advises organisations on technology strategy (currently Zededa, Tezos Foundation, Tarides, and others). He has worked in academia (Cambridge, Imperial, UCLA), industry (NetApp, Citrix, Intel), and startups (XenSource, Unikernels, Docker) over the past two decades.

12.40pm Panel discussion

1.00pm Breakout groups

1.30pm Plenary

1.40pm Lunch

2.30pm Session 3: Scientific Advances powered by AI, and New Science Enabled by AI

Recent progress in protein folding has been dramatic. AlphaFold seized the scientific public's imagination, winning recent CASP Protein Folding challenges. Challenges in biometrics, such as facial recognition, have also seen progress over time, where a 'Moore's Law' for recognition performance has been observed across 30 years.

Scientists are finding diverse applications of AI in scientific practice across many fields. AI accelerates practice within individual disciplines, for example by enabling data to be processed with super-human capabilities. With impacts in chemistry and biology, AIs also are helping design future experiments and identify improved algorithms.

Chair: Dr David Donoho NAS
Stanford University

David Donoho has studied the exploitation of sparse signals in signal recovery, including for denoising, superresolution, and solution of underdetermined equations. His research with collaborators showed that ell-1 penalisation was an effective and even optimal way to exploit sparsity of the object to be recovered. He coined the notion of compressed sensing which has impacted many scientific and technical fields, including magnetic resonance imaging in medicine, where it has been implemented in FDA-approved medical imaging protocols and is already used in millions of actual patient MRIs.

In recent years David and his postdocs and students have been studying large-scale covariance matrix estimation, large-scale matrix denoising, detection of rare and weak signals among many pure noise non-signals, compressed sensing, and related scientific imaging problems, and most recently, empirical deep learning.

2.40pm Highly Accurate Protein Structure Prediction with AlphaFold

Dr John Jumper
Director, Google DeepMind

John Jumper received his PhD in Chemistry from the University of Chicago, where he developed machine learning methods to simulate protein dynamics. Prior to that, he worked at D.E. Shaw Research on molecular dynamics simulations of protein dynamics and supercooled liquids. He also holds an MPhil in Physics from the University of Cambridge and a BS in Physics and Mathematics from Vanderbilt University. At DeepMind, John is leading the development of new methods to apply machine learning to protein biology. John has won numerous awards for his work, including the Lasker Award, Breakthrough Prize in Life Sciences, the Canada Gaidner International Award, and the BBVA Foundation Frontiers of Knowledge Award.

2.55pm Community Critical Assessment Experiments and AI

Professor John Moult
University of Maryland

John Moult is a Fellow at the Institute for Bioscience and Biotechnology Research and Professor in the Department of Cell Biology and Molecular Genetics at the University of Maryland. He is co-founder and Chair of CASP (Critical Assessment of Protein structure Prediction), an organisation that conducts large-scale community experiments in protein structure modelling, and joint founder of CAGI, a sister organisation for advancing genome interpretation. He is an ex-crystallographer turned computational biologist. His research interests include the relationship between genetic variation and human disease, disease mechanisms, protein structure, and new ways of doing science.

3.10pm The Impact of 30 Years of Face Recognition Competitions

Dr Jonathon Phillips
National Institute of Standards and Technology

Dr P Jonathon Phillips is an Electronic Engineer at the National Institute of Standards Technology. Jonathon is a leading researcher in computer vision, face recognition, biometrics, and forensics. He pioneered the development of competitions in face recognition, biometrics, and computer vision. Dr Phillips was assigned to DARPA as a program manager. His work has been reported in print media, including the New York Times and the Economist. He has appeared on National Public Radio's ScienceFriday. He won the inaugural IEEE Mark Everingham Prize, the 2022 NIST Distinguished Career Award, the 2018 IEEE Biometric Council Leadership Award, two Dept. of Commerce Gold Medals (2003 and 2020), and the 2021 FedId Career Achievement Award.

3.25pm Biomedical Sciences and AI: A Two-Way Street

Professor Caroline Uhler
Broad Institute of Massachusetts Institute of Technology & Harvard

Caroline Uhler is a core institute member of the Broad Institute of MIT and Harvard, where she directs the Eric and Wendy Schmidt Center. She is also a professor in MIT's Department of Electrical Engineering and Computer Science and the Institute for Data, Systems, and Society.

Caroline is recognised as a creative and innovative researcher and teacher at the intersection of machine learning, statistics, and biology. She has received prestigious career prizes including an NIH New Innovator Award, a Simons Investigator Award, a Sloan Research Fellowship, a Sofja

Kovalevskaja Award, and an NSF Career Award. She obtained her PhD in statistics from UC Berkeley and then spent three years as an assistant professor at IST Austria before joining the faculty at MIT.

3.40pm Using AI to Enable Science

Professor Andrew Zisserman FRS
University of Oxford

Andrew Zisserman is a Royal Society Research Professor and the Professor of Computer Vision Engineering at the Department of Engineering Science, University of Oxford, and a Distinguished Scientist at Google DeepMind. He graduated from the University of Cambridge with a degree in theoretical physics. For the past 35 years he has carried out research in Computer Vision, and is known internationally for his pioneering work in multiple view geometry, visual recognition, and large scale retrieval in images and video. He has coauthored and coedited several books on this area including *Visual Reconstruction* (with Andrew Blake) and *Multiple View Geometry in Computer Vision* (with Richard Hartley). His papers have received multiple best paper and test-of-time awards at the principal Computer Vision conferences. He was awarded the Royal Society Bakerian medal in 2023.

3.55pm Panel discussion

4.15pm Breakout groups

4.45pm Plenary

4.55pm Close of day 1

5.00pm Drinks reception

6.00pm Dinner

Meeting day 2 – Wednesday 12 June 2024

9.00am Session 4: Enabling Open Science, Reproducibility, Replicability, and Privacy

This session will discuss the issues and opportunities that arise when conducting open science with AI, as well as the unique challenges to ensuring reproducibility and replicability when using AI in science.

Chair: Professor Chris Holmes
University of Oxford

Chris specialises in computational statistics and statistical machine learning for medical and health sciences. With a focus on probabilistic models and Bayesian analysis, he develops methodologies for complex biomedical data.

As a founding member of ELLIS and editorial board member of the *New England Journal of Medicine AI*, Chris is committed to advancing AI in healthcare. Formerly, he served as the inaugural Scientific Director for Health at the Alan Turing Institute, leading collaborations with Health Data Research UK Institute to innovate AI applications.

Chris holds a Statutory Professorship at the University of Oxford, held jointly between the Department of Statistics and the Big Data Institute in the Nuffield Department of Medicine. He is Theme Lead for Machine Learning at Oxford's Big Data Institute, driving cutting-edge research in leveraging health data for impactful analysis.

9.10am On Emergent Limits to Knowledge – Or, How to Trust the Robot Researchers: A Pocket Guide

Professor Victoria Stodden
University of Southern California

Victoria Stodden is Associate Professor in the Department of Industrial and Systems Engineering at the University of Southern California. Professor Stodden analyses the reliability of scientific results, particularly in the context of sophisticated computational approaches to research. Professor Stodden has published extensively in academic journals and conference proceedings, and co-edited two books: *Privacy, Big Data, and the Public Good: Frameworks for Engagement*, and *Implementing Reproducible Research*. She has served as associate editor for *the Harvard Data Science Review*, the *Annals of Applied Statistics*, and on the editorial advisory boards of a number of other statistics and data science journals. Before joining USC, Professor Stodden held visiting and permanent faculty positions at the University of California, Berkeley; Columbia University; and the University of Illinois at Urbana-Champaign. She was a Kauffman Fellow in Law and Innovation at Yale Law School and a fellow at Harvard Law School's Berkman Center for Internet & Society.

9.25am The Broader Implications of Reproducibility: Ethics, Accessibility and Carbon Footprint

Dr Sasha Luccioni
Hugging Face

Dr Sasha Luccioni is a leading scientist at the nexus of artificial intelligence, ethics, and sustainability, with a PhD in AI and a decade of research and industry expertise. She is the Climate Lead at Hugging Face, a global startup in responsible open-source AI, where she spearheads research, consulting, and capacity-building to elevate the sustainability of AI systems. A founding member of Climate Change AI (CCAI) and a board member of Women in Machine Learning (WiML), Sasha is passionate about catalysing impactful change, organising events and serving as a mentor to under-represented minorities within the AI community.

9.40am Reproducing what we Sow

Professor Mark Kelson
University of Exeter

Mark is a data botherer. He has interests in causality, policy evaluation, health data, physical activity and open science. He is Professor of Statistics for Health at the University of Exeter. He has a background in clinical trials. He is part of the Institute for Data Science and AI at Exeter and is a Turing Fellow. He is the UK reproducibility network institutional lead. He would be professionally embarrassed if his ChatGPT search history were ever to become public. He keens the loss of Twitter (X if you insist) as a scientific forum. He lives in Devon with his wife and two children and loves fetching things just after he has sat down.

9.55am A Transparent and Evidence-based Approach for AI in Health

Dr Xiaoxuan Liu
University of Birmingham & University Hospitals Birmingham

Xiao is a Senior Clinician Scientist at University of Birmingham and University Hospitals Birmingham. She co-leads the Birmingham AI & Digital Health Group, a research and policy group focused on responsible innovation and regulatory science in AI health technologies. She is a Deputy Editor at NEJM-AI, vice-chair of the WHO focus group for Clinical Evaluation of AI in Health and advisor to the MHRA on AI as Software as a Medical Device. She has led international efforts for responsible innovation in medical AI, including SPIRIT-AI and CONSORT-AI reporting guidelines for AI clinical trials, and development of the STANDING Together recommendations for tackling algorithmic bias and health inequalities. Previously, Xiao was an ophthalmology doctor in the NHS and a Health Scientist at Apple.

10.10am The opportunities of AI to maintain and improve the trust and integrity of the scientific record

Dr Rebecca Lawrence
Managing Director, F1000

Rebecca Lawrence is Managing Director of the open research publisher, F1000, now part of Taylor & Francis. She was responsible for the launch of F1000Research in 2013 and has subsequently led the initiative behind many funder- and institution-based publishing platforms partnering with the EC, Gates Foundation, Wellcome and others, that aim to provide a new trajectory in the way scientific findings and data are shared.

She is currently Vice-Chair of DORA (San Francisco Declaration on Research Assessment) and was a member of the European Commission's Open Science Policy Platform, chairing their work on next-generation indicators and Editor of their final report. She was also a member of the US National Academies (NASEM) Committee on Advanced and Automated Workflows, and has been co-Chair of many working groups on data and peer review, including for Research Data Alliance (RDA) and ORCID. She has worked in STM publishing for over 25 years and holds a PhD in Pharmacology.

10.25am Panel discussion

10.45am Breakout groups

11.15am Plenary

11.25am Coffee break

11.40am Session 5: Panel on Recent Publications

This panel will cover two recent publications: President's Council of Advisors on Science and Technology (PCAST) report "*Supercharging Research: Harnessing Artificial Intelligence to Meet Global Challenges*", and the Royal Society report "*Science in the Age of AI: How Artificial Intelligence is Changing the Nature and Method of Scientific Research*".

Chair: Professor Alison Noble CBE FREng FRS
University of Oxford & The Royal Society
Forum Co-chair

Professor Terence Tao NAS FRS
University of California, Los Angeles & Co-Lead, PCAST

Terence Tao was born in Adelaide, Australia in 1975. Terence Tao is a professor of mathematics at UCLA. Tao's areas of research include harmonic analysis, PDE, combinatorics, and number theory. He has received a number of awards, including the Fields Medal in 2006 and the Breakthrough Prize in Mathematics in 2015. Terence Tao is a Fellow of the Royal Society, the Australian Academy of Sciences, the National Academy of Sciences, and the American Academy of Arts and Sciences. He currently serves on the President's Council of Advisors on Science and Technology.

Professor Maria Zuber NAS
Massachusetts Institute of Technology & Co-Chair, PCAST

Maria Zuber is the E. A. Griswold Professor of Geophysics and presidential advisor for science and technology policy at MIT, tracking trends and seizing opportunities to inform and advance enlightened state and federal policy. She also provides strategic direction to campus labs, centers, and initiatives connected to defence or national security and represents MIT with external stakeholders.

Zuber served as vice president for research from 2013 to 2024, and was responsible for research administration and policy, research relationships with the federal government, and oversight of MIT Lincoln Laboratory and more than a dozen interdisciplinary research laboratories and centers. In that role, she led the team that developed and provided oversight for MIT's Climate Action Plan.

Zuber's research bridges planetary geophysics and the technology of space-based laser and radio systems. Since 1990, she has held leadership roles associated with scientific experiments or instrumentation on ten NASA missions, most notably serving as principal investigator of the Gravity Recovery and Interior Laboratory (GRAIL) mission. Zuber currently serves as Chair of the Standing Review Board of NASA's Mars Sample Return mission.

In 2013, President Obama appointed her to the National Science Board, and in 2018 she was reappointed by President Trump. She served as Board Chair from 2016-2018. In 2021, President Biden named her as co-chair of the President's Council of Advisors on Science and Technology (PCAST).

Dr Frances Arnold NAS
California Institute of Technology & Co-Chair, PCAST

Frances Arnold is the Linus Pauling Professor of Chemical Engineering, Bioengineering, and Biochemistry at the California Institute of Technology. She was awarded the Nobel Prize in Chemistry in 2018 for pioneering directed enzyme evolution and has used directed protein evolution for applications in alternative energy, chemicals, and medicine. Her lab is developing new methods of machine-learning guided enzyme evolution and exploring non-natural enzyme reactivities. In 2021, Arnold was appointed co-chair of President Biden's Council of Advisors on Science and Technology (www.whitehouse.gov/PCAST). Her work has been recognised with numerous awards, including the Charles Stark Draper Prize of the National Academy of Engineering (2011), the National Medal of Technology and Innovation (2011), and the Millennium Technology Prize (2016). She has been elected to the National Academies of Science, Medicine, and Engineering. In 2019, she was appointed to the Pontifical Academy of Sciences by Pope Francis. Arnold earned her BS in Mechanical and Aerospace Engineering from Princeton University and PhD in Chemical Engineering from the University of California, Berkeley.

Areeq Chowdhury
The Royal Society

Areeq Chowdhury is Head of Policy (Data and Digital Technologies) at the Royal Society. His team focuses on how artificial intelligence and other data-driven technologies can, and should, be used to benefit humanity.

Areeq is also an elected Councillor for Canning Town, in East London, and founded the influential technology policy think tank, WebRoots Democracy, which ran between 2014 and 2020. He has authored various reports on digital democracy, social media, and artificial intelligence. Most notably, he led a high-profile project on disinformation during the 2019 UK General Election, producing viral deepfakes of Boris Johnson and Jeremy Corbyn endorsing each other for Prime Minister.

Areeq holds a BSc in Economics and Political Science from the University of Birmingham. His career history includes working at: the Foreign Office; the Department for Digital, Culture, Media and Sport; the UK Parliament; London City Hall; and KPMG.

12.30pm Lunch

1.15pm Session 6: Responsible AI in Science

This session will address the care that must be taken to ensure AI in science is used responsibly and ethically, in ways that support science's broad goal to better humanity.

Chair: Professor William Press NAS
University of Texas at Austin & National Academy of Sciences
Forum Co-chair

1.25pm AI Scientists as Partners in Scientific Discovery

Dr Yolanda Gil
University of South California

Dr Yolanda Gil received her PhD in Computer Science from Carnegie Mellon University. She then joined the University of Southern California and is currently Fellow and Director for AI and Data Science Initiatives at the Information Sciences Institute and the Viterbi School of Engineering, and Research Professor in Computer Science. Dr Gil collaborates with scientists in many domains on semantic workflows and knowledge capture, provenance and trust, task-centered collaboration, and automated discovery. She is a Fellow of the Association for Computing Machinery (ACM), the Institute of Electrical and Electronics Engineers (IEEE), the Cognitive Science Society (CSS), and the Association for the Advancement of Science (AAAS). She is also Fellow of the Association for the Advancement of Artificial Intelligence (AAAI) and served as its 24th President. In 2022, she became the first computer scientist to receive the M. Lee Allison Award for Outstanding Contributions to Geoinformatics and Data Science from the Geological Society of America (GSA).

1.40pm Science Challenges of AI: Openness, Scientific Norms, Speed

Dr Stuart Feldman
Schmidt Sciences

Feldman is President and Chief Scientist of Schmidt Sciences. He is responsible for shaping the overall programs including fellowship and award programs, and large research programs to support talented scientists who address major questions, build new platforms, and change the way research is done. These programs focus on Astrophysics and Space, Climate, AI and Advanced Computing, and Synthetic Biology.

Stuart Feldman did his academic work in astrophysics and mathematics and earned his AB at Princeton and his PhD at MIT. He was awarded an honorary Doctor of Mathematics by the University of Waterloo and an Honorary Doctorate by the Technion. Feldman is best known for writing "*Make*" and other essential tools, for which he received the 2003 ACM Software System Award.

He is Board Chair of the Center for the Minorities and Disabled in IT, former President of ACM (Association for Computing Machinery) and a Fellow of IEEE, ACM, and AAAS.

1.55pm The New Tech Bubble?: Deflating AGI Myths & Legends

Professor David Leslie
Queen Mary University of London & The Alan Turing Institute

David Leslie is the Director of Ethics and Responsible Innovation Research at The Alan Turing Institute and Professor of Ethics, Technology and Society at Queen Mary University of London. He previously taught at Princeton's University Center for Human Values, Yale's programme in Ethics, Politics and Economics and at Harvard's Committee on Degrees in Social Studies, where he received over a dozen teaching awards including the 2014 Stanley Hoffman Prize for Teaching Excellence. David is the author of the UK Government's official guidance on the responsible design and implementation of AI systems in the public sector, *Understanding artificial intelligence ethics and safety* (2019) and a principal co-author of *Explaining decisions made with AI* (2020), a co-badged guidance on AI explainability published by the UK's Information Commissioner's Office and The Alan Turing Institute. After serving as an elected member of the Bureau of the Council of Europe's (CoE) Ad Hoc Committee on Artificial Intelligence (CAHAI) (2021-2022), he was appointed, in 2022, as Specialist Advisor to the CoE's Committee on AI where he has led the writing of the zero draft of its *Human Rights, Democracy and the Rule of Law Impact Assessment for AI*, which will accompany its forthcoming AI Convention. He also serves on UNESCO's High-Level Expert Group steering the implementation of its Recommendation on the Ethics of Artificial Intelligence.

2.10pm Ethics, Integrity and Public Trust in AI-Enabled Science

Professor Shannon Vallor
University of Edinburgh

Professor Shannon Vallor is the Baillie Gifford Chair in the Ethics of Data and Artificial Intelligence at the Edinburgh Futures Institute (EFI) at the University of Edinburgh, where she is also appointed in Philosophy. She is Director of the Centre for Technomoral Futures in EFI, and co-Director of the UKRI's BRAID (Bridging Responsible AI Divides) programme. Professor Vallor's research explores how AI, robotics, and data science reshape human moral character, habits, and practices. Her work includes advising policymakers and industry on the ethical design and use of AI, and she is a former Visiting Researcher and AI Ethicist at Google. She is the author of *Technology and the Virtues: A Philosophical Guide to a Future Worth Wanting* (Oxford University Press, 2016) and *The AI Mirror: Reclaiming Our Humanity in an Age of Machine Thinking* (Oxford University Press, 2024).

2.25pm AI's scope and limits in astronomy and fundament physics

Lord Martin Rees OM Kt HonFREng FRS NAS
Astronomer Royal

Astronomer and cosmologist; former Director of Cambridge
Institute of Astronomy, Master of Trinity College, Cambridge and
President of Royal Society. Co-founder of Cambridge Centre for
the Study of Existential Risks (CSER). Currently Astronomer Royal
and member of House of Lords. Author of 12 books including, most
recently, *On the Future* (paperback 2022), *If science is to save us*
(2022), and *The End of Astronauts*, (with D Goldsmith 2022).

2.40pm Panel discussion

3.00pm Breakout groups

3.30pm Plenary

3.40pm Forum closing remarks

Professor Alison Noble CBE FREng FRS
University of Oxford & The Royal Society
Forum Co-chair

3.50pm Forum adjourns

Forum Participants

Dr Nancy C Andrews
Boston Children's Hospital & National Academy of Sciences

Nancy Andrews is Executive Vice President and Chief Scientific Officer at Boston Children's Hospital. She assumed that position after more than a decade at Duke University, where she served as Dean of the School of Medicine. Earlier in her career, she was the George Richards Minot Professor of Pediatrics at Harvard Medical School and Boston Children's Hospital and an investigator of the Howard Hughes Medical Institute. Her laboratory discovered molecules important in mammalian iron homeostasis and worked out the molecular causes of several diseases characterised by abnormal iron handling. In addition to the NAS, Andrews is an elected member of the NAM and the American Academy of Arts and Sciences. She is a past president of the American Society of Clinical Investigation and a past Chair of the Board of the American Academy of Arts and Sciences. She currently serves on the Boards of Directors of Novartis, Charles River Laboratories and Maze Therapeutics. Andrews earned her BS and MS from Yale, her PhD from MIT, and her MD from Harvard Medical School. She did her clinical training in pediatric hematology and oncology at Boston Children's Hospital and Dana-Farber Cancer Institute.

Professor L. Cate Brinson
Duke University

Cate Brinson is the Sharon and Harold Yoh Professor and Donald Alstadt Department Chair of the Mechanical Engineering and Materials Science Department at Duke University. She obtained her PhD from Caltech and was faculty at Northwestern University prior to joining Duke. She is an expert in the broad area of mechanics of materials, with emphasis on complex hierarchical materials and polymer based systems, and merging concepts of data science into materials. Experimental and computational work spans the range of molecular interactions, micromechanics and macroscale behaviour. Current research foci include nanostructured polymers, interfacial behaviour, structural metamaterials and data platforms for material query and design. Her awards include the Eringen Medal of SES, the Nadai Medal of ASME, the Bessel Prize of the Humboldt Foundation and a Fellow of many professional societies. She served on the SES Board of Directors and is a founding member of the Materials Research Data Alliance (MaRDA).

Professor Kyunghyun Cho
New York University & Genentech

Kyunghyun Cho is a professor of computer science and data science at New York University and a senior director of frontier research at the Prescient Design team within Genentech Research & Early Development (gRED). He is also a CIFAR Fellow of Learning in Machines & Brains and an Associate Member of the National Academy of Engineering of Korea. He served as a (co-)Program Chair of ICLR 2020, NeurIPS 2022 and ICML 2022. He is

also a founding co-Editor-in-Chief of the *Transactions on Machine Learning Research (TMLR)*. He was a research scientist at Facebook AI Research from June 2017 to May 2020 and a postdoctoral fellow at University of Montreal until Summer 2015 under the supervision of Professor Yoshua Bengio, after receiving MSc and PhD degrees from Aalto University April 2011 and April 2014, respectively, under the supervision of Professor Juha Karhunen, Dr Tapani Raiko and Dr Alexander Ilin. He received the Samsung Ho-Am Prize in Engineering in 2021. He tries his best to find a balance among machine learning, natural language processing, and life, but almost always fails to do so.

Professor Miles Cranmer
University of Cambridge

Miles Cranmer is Assistant Professor in Data Intensive Science at the University of Cambridge, with joint appointments in the Department of Applied Mathematics and Theoretical Physics and the Institute of Astronomy. Cranmer completed his PhD at Princeton University and before that his BSc at McGill University. His research focuses on accelerating scientific discovery by developing and applying novel methods at the intersection of machine learning and physics. Cranmer cares deeply about interpretability in machine learning, and has created a suite of standard software libraries for "symbolic regression" – which have been utilised in numerous scientific discoveries. His work covers various areas of deep learning, including physics-motivated architectures such as Lagrangian Neural Networks. Cranmer is an active open-source contributor, particularly in the Julia programming language ecosystem, and in his work and teaching, stresses the importance of high-quality, accessible software for productive science.

Dr Siân Culley
King's College London

Siân is a Royal Society University Research Fellow at the Randall Centre for Cell & Molecular Biophysics at King's College London. She has a background in cell biology and optical physics. Her research interests are in the interplay between image quality and the biological information content of images in fluorescence microscopy. She is particularly interested in how emerging image processing techniques based on deep learning impact structural information contained within images, and the effectiveness with which this information can be retrieved. By studying the impact that different image acquisition settings and downstream image processing techniques have on the accuracy of structural measurements, she hopes to establish methods for designing more robust and efficient biological microscopy experiments.

Professor Graeme Day
University of Southampton

Graeme Day is a Professor of Chemical Modelling in the School of Chemistry at the University of Southampton, where his research concerns the development of computational methods for predicting the structure and properties of molecular crystals. A key focus of this work is the prediction of crystal structures from first principles; his research group applies these methods in a range of

applications, including pharmaceutical solid form screening, NMR crystallography and computer-guided discovery of functional materials. He is the author of over 150 publications, including 5 book chapters, in this area. Graeme was awarded the Corday-Morgan Prize from the Royal Society of Chemistry in 2023 for pioneering the development of computational methods for guiding the discovery of functional molecular crystals.

Professor Nando Fioretto
University of Virginia

Ferdinando (Nando) Fioretto is an assistant professor at the University of Virginia. He works at the juncture of Machine Learning, privacy, optimisation, and fairness. His research has been recognised with the 2022 Caspar Bowden PET award, the IJCAI-22 Early Career spotlight, the 2017 AI*AI Best AI dissertation award, and several best paper awards. He is a recipient of the NSF CAREER award, the Google Research Scholar Award, the Amazon Research Award, the ISSNAF Mario Gerla Young Investigator Award, and the ACP Early Career Researcher Award.

Professor Baylor Fox-Kemper
Brown University

Fox-Kemper studies the physics of the ocean and how the ocean fits into the Earth's climate system, using models that range from the global scale to focused process models that apply universally. He seeks mathematically interesting problems with practical uses. Recently, he has been using machine learning and statistical modelling techniques to create efficient emulators of parts of the earth system.

Kenneth R Fulton
National Academy of Sciences

Kenneth R Fulton is the Executive Officer of the National Academy of Sciences. Following service in the US Navy, where he was trained as a linguist, he joined the staff of the Academy in 1971. He served as a staff officer in the National Research Council until 1980, when he was appointed to the Academy's executive office. Mr Fulton directs the Academy's membership activities, including the election of its officers and members, and their annual and regional meetings; the offices of the Academy president, vice president, and home secretary, and its governing Council; program activities, including NAS awards, bilateral scientific Forums with the UK and Israel, the US and multi-national *Frontiers of Science* symposia; the *LabX* public engagement program; and the *Office of Cultural Programs,* which presents activities that explore the intersections among the arts, science, and popular culture. He is the publisher of the *Proceedings*, the Academy's journal of original research, and *PNAS Nexus*, an open access scientific journal focused on the publication of high-quality original research from across the biological, medical, physical, social, and political sciences, and engineering and mathematics. He also serves as the executive director of The National Academies' Corporation.

Professor Yarin Gal
University of Oxford & AI Safety Institute

Yarin leads the Oxford Applied and Theoretical Machine Learning Group group. He is an Associate Professor of Machine Learning at the Computer Science department, University of Oxford. Yarin is also the Tutorial Fellow in Computer Science at Christ Church, Oxford, a Turing AI Fellow at the Alan Turing Institute, and Director of Research at the UK Government's AI Safety Institute.

Professor Ben Glocker
Imperial College London

Ben Glocker is Professor in Machine Learning for Imaging at the Department of Computing at Imperial College London where he co-leads the Biomedical Image Analysis Group. He is the Kheiron Medical Technologies / Royal Academy of Engineering Research Chair in Safe Deployment of Medical Imaging AI. He also leads the HeartFlow-Imperial Research Team and is Head of ML Research at Kheiron. His research is at the intersection of medical imaging and artificial intelligence aiming to build safe and ethical computational tools for improving image-based detection and diagnosis of disease.

Professor Yulan He
King's College London

Yulan He is a Professor in Natural Language Processing at the Department of Informatics in King's College London. She is currently holding a prestigious UKRI Turing AI Fellowship. Yulan's research interests lie in the integration of machine learning and natural language processing for text analytics. She has published over 200 papers. Topics include machine reading comprehension, model interpretability and trustworthy AI, NLP for health, finance, and education, and claim veracity assessment. She has received several prizes and awards, including a SWSA Ten-Year Award, a CIKM Test-of-Time Award, and AI 2020 Most Influential Scholar Honourable Mention by AMiner. She has served as the General Chair for AACL-IJCNLP 2022, a Program Co-Chair for EMNLP 2020, an Action Editor for *Transactions of the ACL*, and an Associate Editor for the *Royal Society Open Science* journal. Yulan obtained her PhD degree in Spoken Language Understanding from the University of Cambridge.

Professor Alexander Huth
The University of Texas at Austin

Alex Huth is an Assistant Professor at The University of Texas at Austin in the departments of neuroscience and computer science. His lab uses natural language stimuli and fMRI to study language processing in human cortex in work funded by the Burroughs Wellcome Foundation, Sloan Foundation, Whitehall Foundation, NIH, and others. Before joining UT, Alex did his PhD and postdoc in Jack Gallant's laboratory at UC Berkeley, where he developed

novel methods for mapping semantic representations of visual and linguistic stimuli in human cortex.

Professor Eun-Ah Kim
Cornell University

Dr Eun-Ah Kim is a pioneer in applying machine learning to unlock the mysteries of quantum materials. As a Professor of Physics at Cornell University, she leads a research group that develops novel techniques to analyse complex data and make groundbreaking discoveries. Her work has shed light on emergent phenomena and holds promise for the future of quantum technologies.

Professor Cecilia Lindgren
University of Oxford

Dr Cecilia Lindgren is Professor of Genomics of Endocrinology and Metabolism at the University of Oxford. She finished her PhD at Lund University, Sweden and the Whitehead Institute, Centre for Genome Research, Cambridge US. After post-doctoral work at the Karolinska Institute, she joined the Wellcome Trust Centre for Human Genetics at Oxford University, after which she spent three years as a Scholar in Residence at the Broad Institute of Harvard and MIT before returning to Oxford. In 2021 she was appointed Director of the Oxford Big Data Institute, a role she has just stepped out of in early 2024. Her work has contributed to a substantial furthering of our understanding of the genetic landscape of common complex traits, particularly obesity and fat distribution. She is elected fellow of Academy of Medical Sciences, has been the recipient of numerous awards and has been listed amongst Thomson Reuters 100 "most highly cited researchers" in Molecular Biology and Genetics consecutively since 2014. Cecilia work focuses on understanding the mechanisms involved in common complex diseases, with a particular focus on obesity, by applying a range of genetic and genomic approaches to identify genetic risk variants and dissect their function. This knowledge will support therapeutic advances through development of new diagnostic tools and possible drug targets. Throughout her career Cecilia has published over 230 papers and holds an h-index of 131 which have amassed >130,000 total citations.

Professor Chris Nemeth
Lancaster University

Chris Nemeth is a Professor of Statistics at Lancaster University. His research is in the area of computational statistics and machine learning, with a focus on the development of Monte Carlo methods and optimisation algorithms for Bayesian inference problems. His research has applications in network analysis, environmental science, and signal processing. He currently holds a UKRI-EPSRC Turing AI Fellowship on Probabilistic Algorithms for Scalable and Computable Approaches to Learning (PASCAL) and is an investigator in the EPSRC-funded Probabilistic AI Hub. Professor Nemeth is the AI theme lead in Lancaster University's Data Science Institute and Lancaster's machine learning lead within the N8 consortium.

Professor Daniel Polani
University of Hertfordshire

Daniel Polani is Professor of Artificial Intelligence at the Department of Computer Science, Director of the Centre for Artificial Intelligence and Robotics (CAIR) and Head of the Adaptive Systems Research Group at the University of Hertfordshire.

His research interests concentrate on the understanding and modelling of collective complex systems and intelligent decision-making, especially in the context of cognition in artificial and biological agents. His research ranges from fundamental questions, such as the role of embodiment, intrinsic motivations, taskless utilities, self-organisation and Artificial Life, to questions from cognitive science, psychology, social science, and biology.

He is co-founder of the 18-monthly GSO (Guided Self-Organization) workshop series, Associate Editor of journals such as *Frontiers in Robotics and AI*, *Advances in Complex Systems*, *Theory in Biosciences*, reviewer for conferences such as NeurIPS, IROS, ICML, AAMAS, IEEE Alife, and has been PI in a number of FP7 and Horizon 2020 European Projects. His interest in bridging the gap between fundamental questions with practical implementation drove his interest and participation in the RoboCup competition series; amongst others, he has been President of the RoboCup Federation during the period July 2017 - July 2019.

Professor Anna Scaife
University of Manchester & Alan Turing Institute

Anna Scaife is Professor of Radio Astronomy at the University of Manchester and one of the inaugural AI Fellows of the Alan Turing Institute. Her research focuses on the use of AI for discovery in data-intensive astrophysics. She has previously led a number of projects in technical radio astronomy development and scientific computing as part of the Square Kilometre Array project, including the design of the computing and storage for a European SKA Data Centre. In 2014, Anna was honoured by the World Economic Forum as one of thirty scientists under the age of 40 selected for their contributions to advancing the frontiers of science in areas of high societal impact. In 2017 she was awarded the Blaauw Chair in Astrophysics at the University of Groningen in The Netherlands for excellence in research and an outstanding international status in astronomy. In 2019, Anna received the Jackson-Gwilt Medal of the Royal Astronomical Society, awarded for outstanding invention, improvement, or development of astronomical instrumentation or techniques.

Professor Philip Stier
University of Oxford

Philip Stier is a climate researcher and Professor of Atmospheric Physics at the University of Oxford. Philip's research topics cover physical aspects of the climate system, with a focus on clouds, aerosols, and radiation, constituting the largest uncertainties in our changing climate system. His research combines climate modelling with Earth observations and machine learning to develop and constrain next generation climate models and he is embracing

explainable AI to gain insights into complex climate processes from vast multi-modal Earth observation data.

Philip serves as President of the Atmospheric Science Division of the European Geosciences Union, curates the UN AI for Good series on AI for Climate Science, leads the EU Marie Skłodowska-Curie Innovative Training Network iMIRACLI on machine learning for aerosol-cloud-climate interactions and serves as Director of Intelligent Earth, Oxford's new Centre for Doctoral Training in AI for the Environment that will train a new generation of over 100 environmental data scientists.

Dr Peter Stone
The University of Texas at Austin & Sony AI

Dr Peter Stone holds the Truchard Foundation Chair in Computer Science at the University of Texas at Austin. He is Associate Chair of the Computer Science Department, as well as Director of Texas Robotics. In 2013 he was awarded the University of Texas System Regents' Outstanding Teaching Award and in 2014 he was inducted into the UT Austin Academy of Distinguished Teachers, earning him the title of University Distinguished Teaching Professor. Professor Stone's research interests in Artificial Intelligence include machine learning (especially reinforcement learning), multiagent systems, and robotics. Professor Stone received his PhD in Computer Science in 1998 from Carnegie Mellon University. From 1999 to 2002 he was a Senior Technical Staff Member in the Artificial Intelligence Principles Research Department at AT&T Labs - Research. He is an Alfred P. Sloan Research Fellow, Guggenheim Fellow, AAAI Fellow, IEEE Fellow, AAAS Fellow, ACM Fellow, Fulbright Scholar, and 2004 ONR Young Investigator. In 2007 he received the prestigious IJCAI Computers and Thought Award, given biannually to the top AI researcher under the age of 35, and in 2016 he was awarded the ACM/SIGAI Autonomous Agents Research Award. Professor Stone co-founded Cogitai, Inc., a startup company focused on continual learning, in 2015, and currently serves as Executive Director of Sony AI America.

Dr Emma Strubell
Carnegie Mellon University

Emma Strubell is the Raj Reddy Assistant Professor in the Language Technologies Institute in the School of Computer Science at Carnegie Mellon University, and a Visiting Scientist at the Allen Institute for Artificial Intelligence. Previously she held research scientist roles at Google and FAIR after earning her doctoral degree in 2019 from the University of Massachusetts Amherst. Her research lies at the intersection of natural language processing and machine learning, with a focus on providing pragmatic solutions to practitioners who wish to gain insights from natural language text via computation- and data-efficient AI. Her work has been recognised with a Madrona AI Impact Award, best paper awards at ACL and EMNLP, and cited in news outlets including the *New York Times* and *Wall Street Journal*.

Dr Gregory H Symmes
National Academies of Sciences, Engineering, and Medicine

Gregory H Symmes is chief program officer and acting chief operating officer for the National Academies. As chief program officer, he oversees the seven program divisions that carry out studies, workshops, and other advisory and convening activities and administer research, fellowship, and grant programs, in addition to the Report Review Committee and Office of Congressional and Government Affairs. As acting chief operating officer, he oversees the Academies' offices of human resources, information and technology services, administration, and program security. He also is responsible for the implementation of the National Academies' five-year strategic plan. After becoming chief program officer in February 2020, Symmes played a key role in how the organisation navigated the COVID-19 pandemic including the development of a new product to provide rapid, science-based guidance on a range of urgent issues. He has also championed new approaches for addressing complex cross-disciplinary issues such as climate change and reproductive health.

Professor Noa Zilberman
University of Oxford

Noa Zilberman is an Associate Professor in the Department of Engineering Science, where she leads the Computing Infrastructure Group, aiming to build sustainable, scalable, and resilient computing infrastructure. Her research explores both Systems for AI and AI for systems. She has led important contributions to in-network machine learning, offloading machine learning to run within programmable network devices, and applying this to address problems within cyber-security, finance, and smart environments. Alongside her work on AI, Professor Zilberman also researches how to improve ICT sustainability, particularly the effect of micro-architectures on large-scale systems' carbon and energy efficiency. Her current efforts are focused on carbon-aware networking, to reduce the carbon footprint of the Internet.