KAVLI INSTITUTE FOR NANOSCIENCE DISCOVERY

UNIVERSITY OF OXFORD

ANNUAL REPORT 2025

JULY 1, 2024 - JUNE 30, 2025

Dear Colleagues and Partners –

I am pleased to say that our Kavli Institute has had another year of substantial progress, from growing collaborations and notable research outputs to thoughtful public and social engagement.
A personal highlight was the annual Kavli Oxford Lecture, presented by Regina E. Dugan, CEO of Wellcome LEAP. Her lecture underscored the power that researchers from across disciplines bring, working together to tackle the grand challenge problems faced by our world today.

I would like to share some reflections on Kavli Oxford's progress 2024-2025 and to outline core themes that will further guide our work in the year ahead.
As we bring this year to a close, our collaborations are increasingly strong, both within and between groups spanning several departments in the Kavli. I have selected a few highlights that resonate with me:

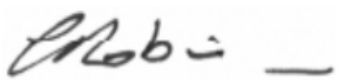
- **Our first Kavli Foundation-funded Science & Society project**: exploring ethics in initiating open discussions and developing our daily scientific practice of responsible research (page 4)
- **Pushing the frontiers of pain research via interdisciplinary collaboration** (page 6)
- **Successful sLoLa BBSRC grant bid from cross-disciplinary Kavli researchers** (page 5)
- **Our first Kavli Oxford and Caltech–pan-institute collaboration**: KICK for chemistry (page 5)
- **The Kavli as a platform for industrial collaboration**: portfolio of programmes targeting Parkinson's disease launched in March 2025 by Professor Richard Wade-Martins and the leadership team of Endlyz Therapeutics
- **Extending our collaborative network:** Professor Jason Chin welcomed as Associate Member of Kavli Oxford. Jason is Founding Director of the Generative Biology Institute at the Ellison Institute of Technology, Oxford

These personal highlights not only demonstrate our commitment to collaborative research in discovery science, but also consolidate Kavli Oxford as an open-minded scientific hub focused on all aspects of quality research: academic excellence, broader upskilling for future scientists, and innovating and translation. Our Kavli's encouragement of improving internal mobility – where researchers have transitioned from technical positions into doctoral programs, post-doctoral researchers pivoting laboratories to apply their expertise to tackle new questions from different angles – shows our ever-increasing fluidity. This fluidity strengthens our capacity to respond nimbly to the scientific challenges of our time.

Into 2025-2026, there are numerous opportunities developing in Kavli Oxford, from nascent cross-lab and cross-Institute collaborations to open dialogue and engagement possibilities for Kavli researchers in skills surrounding how we conduct, debate and communicate our science.

I look forward to our continued growth and success within an ethos of a bold, curious and kind institute.

With warm regards



Professor Dame Carol V. Robinson, Founding Director/Kavli INsD, Oxford

KAVLI OXFORD LECTURES: A FOCUS ON WORLD CLASS INNOVATION

Kavli Oxford Lecture Award 2024: Dr Regina E. Dugan ‘Changing the Business of Breakthroughs’

The third Kavli Oxford Lecture Award took place on 5 December 2024, with keynote speaker Dr Regina E. Dugan, CEO of Wellcome Leap, delivering a powerful address on accelerating health innovation. Drawing parallels to the 1957 launch of Sputnik, she proposed a new "Health Age"—an era of rapid medical progress driven by a global network of over 150 research organisations.

In her talk, "Changing the Business of Breakthroughs", Regina outlined how Wellcome Leap was founded to transform health research through scientific ingenuity.

The event also highlighted two Wellcome Leap-funded projects at Kavli Oxford. Drs Tarick El-Baba and Corrinne Lutomski, working with Professor Dame Carol Robinson, shared their research into anhedonia under the Multi-Channel Psych (MCPsych) programme.
Associate Professor Yujia Qing then presented her Delta Tissue-funded project using nanopore technology to map protein phosphorylation, in collaboration with Kavli Professors Justin Benesch, Philipp Kukura, and colleagues in the Department of Chemistry.

Kavli-Sir Hans Krebs Prize Lecture 2025: Professor Robert Langer ‘Advances in Drug Delivery and Tissue Engineering: Towards Oral Insulin and Artificial Pancreas’

Co-hosted with the Department of Physiology, Anatomy and Genetics, the Kavli / Sir Hans Krebs Prize Lecture was delivered by Professor Robert Langer, Institute Professor at Massachusetts Institute of Technology (MIT) on 24 June 2025.
In his talk, he outlined priorities and challenges in advanced drug delivery systems and the impact on health.
A pioneer in biomedical innovation, Professor Langer’s work has led to cancer and blindness treatments, and the first nanoparticle and microparticle for large molecule drug delivery.

His work has also contributed towards founding the tissue engineering field, which has enabled the generation of artificial skin technologies for burn victims.
Ahead of the lecture, EnSpire Oxford hosted ‘From Lab to Market’, a conversation between Kavli Oxford’s co-Deputy Director, Professor Dame Molly Stevens and Professor Robert Langer.

KAVLI OXFORD AS A HUB FOR INTERDISCIPLINARITY

A year of winning and celebrating interdisciplinary collaborations

Building Societal Considerations into the Heart of Basic Research

Developments in scientific understanding can sometimes raise disagreements — at a societal level, these disagreements are often not about scientific facts, but about what is 'good' or 'right' to do. This means that ethical considerations can, and should, shape the ways in which science occurs. While this has historically taken place through research ethics oversight, there is an increasing awareness of the importance of scientists engaging with the broader societal and ethical implications of their daily work.

Discovery science faces unique challenges in this regard, because its potential implications for society are both distant and uncertain — it can be tempting to think that discovery science does not raise ethical issues. Yet, ethical questions arise not only from the applications of scientific discoveries, but how scientific research itself is designed and carried out. Making ethics a routine part of day-to-day scientific practice, and enabling discovery scientists to engage with the ethical dimensions of their work, requires a strategic and interdisciplinary approach.

As such, in late 2024 we were awarded $250,000 from the Kavli Foundation, USA in support of our aim to establish an Ethics Hub embedded within Kavli Oxford.

Through this work we are proud to support the work of the Kavli Foundation's Ethics, Science and the Public projects.

On Tuesday 8 July 2025, we were pleased to catch up with Brooke Smith, Kavli Foundation Director of Science and Society on her visit to Oxford.

"The Kavli Institute at Oxford is world-leading in science, pushing frontiers at the intersection of physical and cellular science. Their leadership to embed experts to consider ethical and societal implications of work, throughout the research cycle, is also ground-breaking. It is very rare but exceptional, to embed ethicists focused on exploring the societal implications of research, as opposed to research ethics and regulatory compliance."
Science and Society Director, Brooke Smith

Convening an interdisciplinary team, led by Kavli Oxford Director, Professor Dame Carol Robinson (chemist), our Kavli Oxford project, 'Building societal considerations into the heart of basic research', is supported by Dr Mackenzie Graham, project Co-Lead and Senior Research Fellow (philosopher), Dr Emma Lalande, Post-Doctoral Researcher – Science and Society (biophysicist), and is central to the work of the Organisational Development Team led by Désirée Tennant (social scientist).

BBSRC sLoLa Grant Award: drawing from Kavli Oxford's collaborative environment

Quantum Sensing in Nature and Synthetic Biology

This interdisciplinary project aims to uncover how magnetic fields are perceived, focusing on cryptochrome, a protein common to many eukaryotes. The goal is to map the signalling from cryptochrome activation in the eye to brain signals and behaviour. The project led by Christiane Timmel (Department of Chemistry) and Justin Benesch (Kavli, Department of Chemistry) draws from Kavli Oxford's collaborative environment with a five–co-lead team (Andrew Baldwin, Madhavi Krishnan (chemists), Achillefs Kapanidis (physicist), Stuart Peirson, Mark Hankins (neurosciences)). The project award of over £5 million spans 5-years and focuses on spin chemistry, structural biology, biophysics, and behavioural science.

The strategic Longer and Larger (sLoLa) grant is awarded by the Biotechnology and Biological Sciences Research Council (BBSRC).

Kavli Oxford awarded inaugural Kavli Institute Collaboration Kickstarter (KICK) grant

Diffusion-based Barcoding for Next-generation Vaccine Design

To better fight pandemics, vaccines must provide broad and long-lasting protection. A promising approach uses virus-like particles (VLPs) that display pieces (antigens) from multiple virus variants on a single particle, training the immune system to recognise shared features. Advancing this strategy requires precisely measuring how many of each antigen are present on each individual VLPs, a key quantity that existing methods cannot reliably determine.

This KICK project, funded with $80,000, brings together the Björkman group at Kavli Nanoscience Institute at California Institute for Technology (Caltech) and the Kukura group at Kavli Oxford, to develop a novel single-particle assay, combining mass photometry with single particle tracking on membrane surfaces that mimic immune cell interfaces. By measuring both the mass and diffusion of the VLPs, the technique will generate a "diffusion barcode" that quantifies antigen presentation and links these measurements to the strength and breadth of resulting immune responses.

This interdisciplinary collaboration bridges molecular biophysics and vaccine design with next-generation instrumentation development. The goal is to create a practical platform to guide the rational design and characterisation of next-generation vaccine candidates.

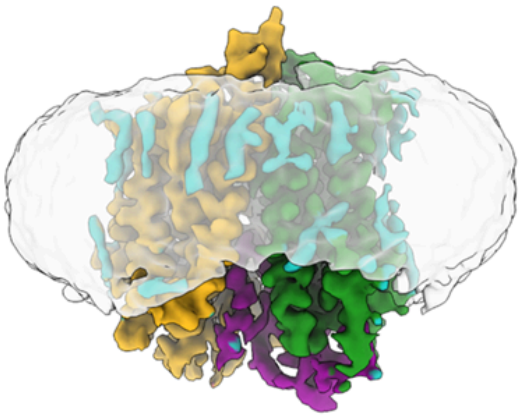
Written by Dr Roi Asor, Post-Doctoral Researcher in the Philipp Kukura group

Major scientific breakthrough uncovers a new genetic link to chronic pain

SLC45A4 – an autoinhibited, pain-regulating polyamine transporter in neurons

Researchers Dr Steven Middleton (PDR, David Bennett group) and Sigurbjörn Markusson (DPhil student, Simon Newstead group) share their progress on an exciting new interdisciplinary project exploring the SLC45A4 transporter protein in human neurons.

Chronic pain is difficult to treat, with few known promising drug targets.
We were, therefore, highly interested when Professor David Bennett contacted Professor Simon Newstead in 2022 to ask if we would be interested to work on SLC45A4, a major facilitator superfamily (MFS) transporter. They had recently linked it with chronic pain in large genome wide association screens. SLC45A4 was an orphan transporter at the time, having no known substrate.



In the project that followed, we identified polyamines (PAs) as substrates through metabolomics, and confirmed that SLC45A4 transports PAs in neurons using biochemical assays. Not only did this facilitate deorphanisation of SLC45A4, but also identify it as the long sought-after plasma membrane PA transporter.

PAs are ubiquitous, polycationic compounds that are involved in many cellular processes, including regulation of pain signalling. To understand the function of SLC45A4 further, we solved its structure using cryo-electron microscopy (CryoEM). The structures revealed a novel cytosolic plug domain, which autoinhibits the transporter. Similar domains have not been seen before in MFS transporters, but indicate a novel mechanism to regulate transport of PAs.

Led by Dr. Steve Middleton, the Bennet group further demonstrate that mice lacking SLC45A4 show altered pain signalling and neuron function – and in collaboration with the Target Discovery Institute – showed that neuronal compartmentalisation of PAs is altered in SLC45A4 knock-out mice.

This project is an excellent example of the benefits of interdisciplinary collaboration. This exceptionally large effort allowed for identifying SLC45A4 as a potential new drug target for much needed medication to combat chronic pain.

Cryo-EM structure of the SCLC45A4 polyamine transporter
Illustration by Sigurbjörn Markusson

INAUGURAL INTERDICIPLINARY SEED FUNDED PROJECTS DRAW TO A CLOSE

This year saw the conclusion of the two innovative and collaborative interdisciplinary projects awarded Kavli Oxford seed funding, proposed by early career researchers in November 2023.

L1CAM and Beyond: Targeting the Neuronal Extracellular Vesicle Code

The team successfully isolated extracellular vesicles (EVs) from post-mortem human brain tissue and, using single-molecule super-resolution microscopy, identified brain cell-type-specific EV surface proteins as well as α-synuclein. The results demonstrate disease-specific localization and carriage of α-synuclein on EVs in a cell-type-dependent manner. In addition, different neuronal surface markers were characterized on brain-derived EVs, establishing a methodological framework for studying pathogenic protein distribution in neurodegeneration. These findings were supported by mass spectrometry-based proteomics, where >400 unique proteins were detected, and native MS illuminated the stoichiometric organisation of protein complexes embedded within EVs.

Awards linked to this work include the ARUK Thames Valley ECR Image Prize (2024), ARUK TV Network Travel Award (2025), ARUK Video Award (2025), and Best Flash Talk Award at the ARUK TV Network Dementia Research Day (2025). Pilot data from the project supported new funding, including an ARUK Thames Valley Pilot Award (2024) and a UKRI-STFC direct access grant (2024). The methodology developed in this project has been transferred to a doctoral student and post-doctoral fellow.

The project was undertaken by:

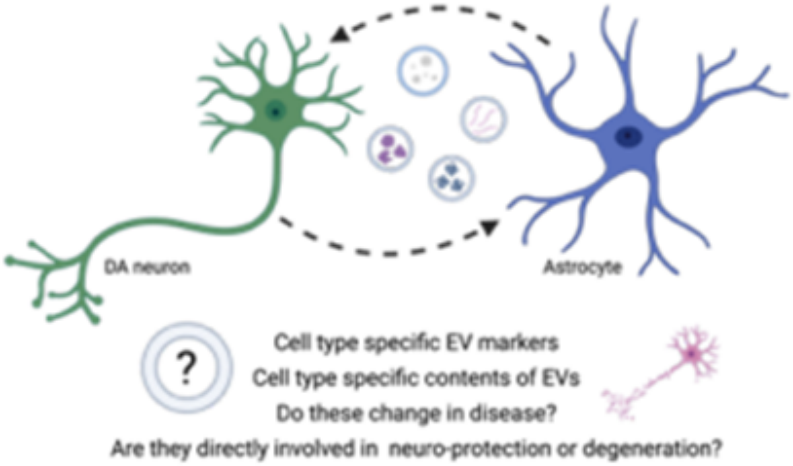
Dr Suman Dutta is a Post-doctoral researcher in Professor George Tofaris' group. Dr Dutta has received a Fellowship from the Department of Biotechnology, Government of India, to establish an independent laboratory at the University of Calcutta from October 2025 where he will continue to apply and expand these methods in his independent research program. He presented the Kavli Seed funding project findings at several international conferences, including Synuclein 2025 (Cambridge), ISEV 2025 (Vienna), OPDC and DPAG research meetings (Oxford), Vesicon 2025 (India), and the ARUK Thames Valley Dementia Research Day (Oxford).

Dr Corinne Lutomski is a Senior Researcher within Professor Dame Carol Robinson's group. She develops new technology in native mass spectrometry to explore how membrane protein modifications alter key interactions underlying neurological and neuropsychiatric disorders.

Since late 2024, **Dr Stelios Chatzimichail** works as post-doctoral fellow at the University of Cyprus and remains a visiting fellow in and alumnus of Kavli Oxford's Professor Achillefs Kapanidis group as part of his ONISILOS Fellowship.

Characterisation of dopamine neuron and astrocyte extracellular vesicles in Parkinson's disease

This project explored the role of extracellular vesicle- (EVs) mediated communication between astrocytes and dopamine neurons in Parkinson's disease (PD). Using induced pluripotent stem cells (iPSCs) from healthy controls and PD patients carrying α-synuclein mutations, we generated astrocytes and dopamine neurons and developed protocols for EV purification via ultracentrifugation and size exclusion chromatography. Nanoparticle tracking analysis revealed that PD astrocytes release more EVs per cell than controls. Western blot analysis further indicated differences in EV size, composition, and abundance between PD and control samples. Additionally, microfluidic co-culture systems were established to study EVs released in astrocyte–dopamine neuron communications.



This study lays a foundation for deeper analysis of EV molecular cargo and their impact on neuronal health and thus collaborations continue with several experts to study EVs released in astrocyte and dopamine co-cultures (Joe Morgan, Dunn School), cryo-electron microscopy to study EV structure (Associate Professor Lindsay Baker, Kavli Oxford), and mass spectrometry to identify cell-specific EV markers and overall EV contents (Treasa O'Hagan, Doctoral Student in the Carol Robinson group). These efforts aim to uncover how EV-mediated communication contributes to PD progression with implications for potential therapeutic targets.

The project was undertaken by **Akansha Meta** and **Dr Hannah Britt**.
Remaining in Kavli Oxford's Professor Richard-Wade Martin's group, Akansha commences Doctoral studies in October 2025. In late 2024, Hannah took up a lectureship at the University of Leeds.

CAREER MOBILITY IN KAVLI OXFORD

Internal mobility as a marker of institutional strength

In support of the career development of our researchers, technicians and professional support staff, we encourage career mobility within Kavli Oxford. Here are selected stories spanning researchers moving between laboratories, shifting roles and pursuing Doctoral studies.

Dr Emma Lalande — DPhil (Biophysics) → PDR (Science & Society)

"Coming into the Kavli Oxford as a biomedical scientist focusing on bacteriology, I recently completed my DPhil with Professor Achillefs Kapanidis Biophysics' group, where I was developing a novel method to detect and track single mRNAs in live E. coli bacterial cells. Throughout my DPhil, I became increasingly interested in the subtler and social sides of research, namely how we communicate effectively within interdisciplinary research spaces. Building on this, I am absolutely delighted to have joined Professor Dame Carol Robinson's group and the Kavli Organisational Development Team as a Post-Doctoral Researcher in Science & Society.

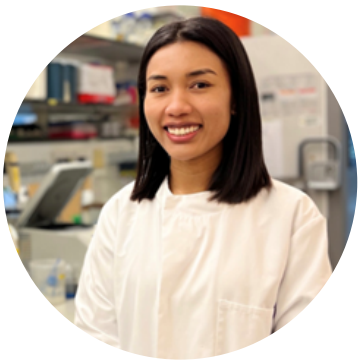
I will be collaborating on our Kavli Ethics project with Dr Mackenzie Graham, exploring broader Kavli science engagement opportunities and contributing to evolving interdisciplinary research practices in our institute. I look forward to learning more about everyone's ongoing work, discussing and evolving how our science and practice can be grown and shared across the Institute and beyond."

Dr Nick Gatford — PDR (Neuroscience) → PDR (Chemistry)

"I joined Kavli Oxford in May 2021, soon after its inauguration, to undertake post-doctoral research on the nanoscopic mechanisms underlying Parkinson's disease in the laboratory of Professor George Tofaris, clinical neuroscience department. As an early member of the Kavli Oxford, it's been inspiring to see how the friendly, collaborative, and curiosity-driven atmosphere has been tailored to encourage interdisciplinary progress and enable flexible mobility within. My work uncovered a new off-target interaction of nanoscale alpha-synuclein aggregation in human dopaminergic neurons.

I've since joined Professor Andrew Baldwin's lab in the chemistry department to study the earliest stages of alpha-synuclein misfolding in phase-separating biomolecular condensates within human neurons. The aim being to identify the origins of Parkinson's as early as possible, opening a window for early intervention. Moving from neuroscience to being surrounded by chemists has been an exciting challenge but still a strangely familiar one given I started in psychology before moving to neuroscience. I've particularly enjoyed bridging the knowledge gaps between our disciplines; making core neuroscience concepts as accessible as possible, so that we can work collaboratively in cross-pollinating our experimental ideas to blend neuroscience and chemistry together."

Dr Finaritra Raoelijaona — PDR → Kavli-Biochemistry Collaboration



"I am currently a joint post-doctoral research associate working between the laboratories of both Associate Professor Lindsay Baker (Kavli Oxford) and Professor Colin Kleanthous (Department of Biochemistry) labs. Before this, I worked in Professor Elena Seiradake's lab, where I focused on understanding the evolutionary relationship between metazoan surface receptors and their bacterial counterparts. During my time spent in the Seiradake lab, I became increasingly interested in understanding how microorganisms respond to their environment within microbial communities.

Always curious about how macromolecules, such as proteins function in a cellular context, I started looking for a project that combined both cellular structural biology and microbiology which turns out to be within the Baker/Kleanthous lab.

I joined their exciting project to investigate bacterial membrane organisation using cryo-electron tomography (cryo-ET) and I also plan to develop labelling techniques to map the spatial organisation of outer-membrane proteins. The project is part of a Wellcome Discovery Award and is highly interdisciplinary. Being in such a collaborative environment allows me to work with scientists with different expertise including computational biology, chemistry, biophysics. This not only helps us tackle complex challenges more effectively but also broadens my perspective and keeps me continuously learning."

Mark Selwood — Apprentice technician → Laboratory Technician

"I joined Kavli Oxford in July 2021 as an Apprentice Laboratory and Facilities Technician, where I learned the fundamental skills needed to be a Laboratory Technician. I enjoyed the two years and six months I spent with the Richard Wade-Martins group, and am very grateful for all the help and support I was given, particularly by my Line Manager, Dr Sarah Pearce.

I passed my apprenticeship in November 2023, leaving Professor Wade-Martins' group in December 2023.
Staying with Kavli Oxford as Laboratory Technician I joined Professor Dame Carol Robinson's lab in January 2024. I have enjoyed working with the whole group for nearly two years now, growing in my role and working well alongside my colleagues, and especially with both our Lab Managers, Parisa Yavari and Dr Andy Dolan."

Success spotlight!

Parisa Yavari completed the Herschel Programme for Women in Technical Leadership over six-months during 2025. The programme supports women in technical roles to thrive in leadership positions. Based in the laboratory of Professor Dame Carol Robinson, Parisa is joined by peers and colleagues as a laboratory manager for the research group.

Celebrating transitions: RA/technician to Graduate studies

Kevin Giraldo

RA/technician → DPhil

"I have worked as a research assistant/technician at Kavli Oxford and am transitioning to DPhil in October 2025, remaining in the laboratory of Professor Dame Molly Stevens.

I first became a part of the Stevens group during my master's degree in Biomedical Engineering at Imperial College London, supported by two competitive scholarships, including a Columbian national award.
My research focused on developing a plasmonic sensor to measure insulin release from pancreatic islets—part of an international organ-on-chip consortium aimed at improving disease modelling for diabetes.

Working in the Stevens group at Kavli Oxford helped me gain a front-row view of world-class research. During this time, I supported multiple projects simultaneously, including collaborations with industry—optimising protocols, managing high-value instrumentation, and ensuring reproducibility across experiments—which directly contributed to the group's productivity and several publications. The experience gave me a strong appreciation of the often-unseen technical expertise that underpins high-impact science.

In 2025, I was awarded the Magdalen College–DPAG scholarship to pursue a DPhil at the University of Oxford's Department of Physiology, Anatomy & Genetics and the Kavli Institute for Nanoscience Discovery. My DPhil research will explore innovative biomaterial platforms for mucosal vaccine delivery, focusing on respiratory applications."

Akansha Meta

RA/technician → DPhil

"Previously I worked as a research assistant/technician in the Wade-Martins Group at Kavli Oxford. During this time, I was a recipient of Kavli Oxford's inaugural seed fund for an interdisciplinary project. Interdisciplinary collaborations give us the opportunity to work with experts from different fields and uncover the true potential of our ideas inspiring me to pursue further studies.

I am commencing my Doctoral studies in October 2025, remaining in the Wade-Martins Lab, studying the role of lysosomal ATPases ATP13A2 and ATP10B in astrocytes, oligodendrocytes, and dopamine neurons in GBA-associated Parkinson's disease.
My project involves developing protocols to generate iPSC-derived glial cells, assessing ATPase levels, function, and their link to lysosomal activity. Ultimately, I will also be establishing co-culture systems to study whether PD astrocytes or oligodendrocytes drive selective dopamine neuron vulnerability in PD."

SCIENCE & SOCIETY

Public engagement and Outreach

This year our faculty and researchers took part in a range of public engagement activities ranging from media participation, fundraising events, meetings for the public to explain and discuss our science, and securing funding to further public engagement.
Spreading awareness of our work is a core element of realising the importance of discovery research and good research practice, culture and impact, both at the level of the researcher and in broader societal contexts.

Public engagement – in the media

- Dr Becky Carlyle and Dr Nathaniel Gould: How the cognitively resilient can swerve dementia – The Telegraph
- Dr Kirsty McHugh and Dr Carolyn Nielsen: To immunity and Beyond - Oxford University Podcast
- Associate Professor Angela Minassian: 25 April 2025 World Malaria Day
- Professor Dame Carol Robinson: BBC Radio 4 Women's Hour [2:17 – 12:34 mins]
- Professor Dame Molly Stevens: Lectures at the Founders Forum, Royal Society Soirée, and the 2024 Dubai Future Forum, and BBC Radio 4 Today Programme hosted by Oxford's Vice Chancellor Professor Irene Tracey (28 December 2024)
- Professor Kevin Talbot: Motor Neuron Disease on The Neurology Lounge Podcast
- Professor Vladyslav Vyazovskiy: What hibernating animals can teach us about human sleep - 'Re:Thinking with Adam Grant'

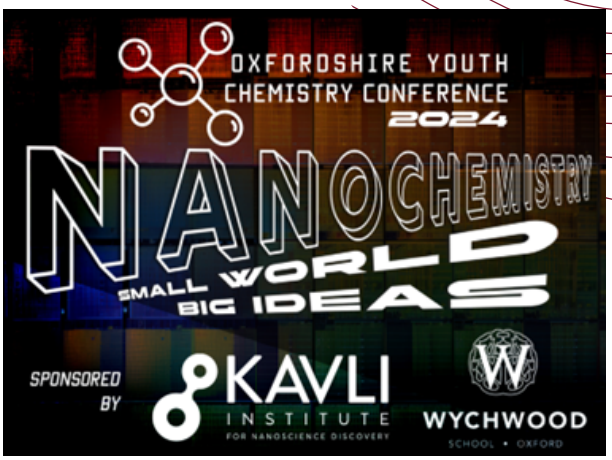
Funded Project Spotlight: 'My Place, My Science'

Associate Professor Weston Struwe has been awarded funds from the UKRI and STFC as specialist co-investigator for the public engagement project 'My Place, My Science: Supporting young people from African families in accessing science capital' - between January 2025 and December 2026.

This project is carried out in conjunction with Science Together, African Families in the UK – a University of Oxford initiative to promote STEM education to children in Blackbird Leys and expose students to science beyond the classroom. With other University of Oxford researchers, young, underrepresented students are supported to pursue their passion in science through regular workshops, like "BioArt" that shows histology images of tissues in health and disease, as well as site visits to the Diamond Light Source and the History of Science Museum.

Science communication: inspiring young aspiring scientists

On Thursday 21st November 2024 Wychwood hosted the 5th annual Oxfordshire Youth Chemistry Conference, sponsored by Kavli Oxford. An opportunity for students from schools across the county to showcase excellence in science communication, the students were attended talks by several Kavli scientists. Professor Dame Carol Robinson recorded an inspirational opening message for the delegates, introducing students to core concepts and uses of nanochemistry.
Dr Mootaz Salman, MRC Career development fellow at Kavli Oxford, gave his opening address on the blood-brain barrier.



Raising awareness of Parkinson's Disease

Fundraising success!

On Sunday 13 October 2024, Kavli Oxford participants ran 13.1 miles through the streets of Oxford. The team of researchers, led by Oliver Curry (DPhil, Wade-Martins group) raised £2,242 for Parkinson's UK.

Oxford University museums' public engagement – World Parkinson's Day

On Friday 11 April 2025, researchers from the Wade-Martins & Ryan groups joined members of the Parkinson's UK Oxford Branch to raise awareness of Parkinson's disease. The drop-in event took place at the Oxford University Museum of Natural History. Members of the public were able to immerse themselves in Virtual Reality (VR) demonstrations of the challenges faced by people who have Parkinson's Disease and dementia. Researchers and volunteers from the branch were on hand to speak to members of the public about the research being carried out by the Laboratory of Molecular Neurodegeneration and understand the work being done to supporting everyone in Oxfordshire who are affected by Parkinson's.

Translational outputs in numbers

Clinical Trials/pharmaceutical translational	14
Patents filed	10
Translational grants: funded research projects	6
Early stage spin-outs	6
Softwares commercialised	1

KAVLI OXFORD INSIGHTS

Thoughts and experiences direct from our researchers

"The Kavli has been a phenomenal boost to the work our laboratory does, in particular for the environment it creates for researchers to develop new ideas that challenge the status quo. Personally, this has allowed me to develop new research ideas which I have then translated into a successful, large grant application that supports activities in five Kavli Oxford labs."

Professor Justin Benesch, Chemistry

"Interdisciplinary research has been the thread connecting every stage of my career. My projects have consistently sat at the intersection of materials science, bioengineering, and immunology, and I have seen first-hand how breakthroughs often arise where disciplines overlap. At Kavli Oxford — a uniquely collaborative environment bridging biology, chemistry, physics, and engineering — I am surrounded by researchers who challenge traditional boundaries. This setting not only shapes my DPhil project but also my long-term vision: to build a research group that integrates AI, biomaterials, and immunology to create transformative technologies for global health."

Kevin Giraldo, incoming DPhil in Professor Dame Molly Stevens

"A fantastic range of collaborative and enthusiastic researchers with widely varying skill sets. No matter which protein you're interested in, someone will be developing cool techniques that may increase your understanding of function, and they'll also be happy to try things out. It's motivating, inspiring, and keeps things interesting."

Dr Becky Carlyle, Early Career Fellow

"Having worked amongst various departments within Oxford, the UK and globally, I can honestly say that the Kavli is an amazing setting for collaborative research. Not only are there world leading groups in various fields in one building, but the ability to be to approach them easily, have open discussions and listen to different lectures, makes Kavli Oxford a catalyst for new ideas and scientific inspiration."

Dr Yosuke Matsumiya, Clinical Doctoral Student, Balliol Sakaguchi Scholar; hosted by Professor George Tofaris

Student and researcher comments on the value of being a part of Kavli Oxford:

- "Proximity enables rapid, informal exchange of methods and ideas, access to shared facilities, and timely feedback on experimental design, e.g. collaboration to combine bioengineering innovation with neuroscience research."
- "Co-location with other groups creates opportunities for interdisciplinary exchange, which enriches our work and allows integration of novel methodologies into our workflow."
- "Collaboration with groups within the institute fosters peer-to-peer technical problem solving"
- "This spirit of collaboration helps in connecting people to different research groups and allowing them to learn about the many facets of science that are being pursued at the Institute."

KAVLI OXFORD ACHIEVEMENTS

Spotlights on successes

Kavli Oxford continues to host and demonstrate world-class science across the board, supported and encouraged by fostered collaborations, shared laboratory space and scientific debate.
Congratulations to all Kavli Oxford members who received personal recognition, awards and prizes. Ranging from learned societies' awards, charitable recognition, science communication prizes and expert advisory contributions, there is much to celebrate – explore successes on our Kavli Oxford website.

Kavli Scholar

Launched in 2023, Kavli Scholars receive a 3-year award for Doctoral Studies to aid individuals seeking new work environments due to extreme circumstances that interrupt their scientific research. Kavli Oxford hosts Doctoral Scholar, Vladyslav Kim.

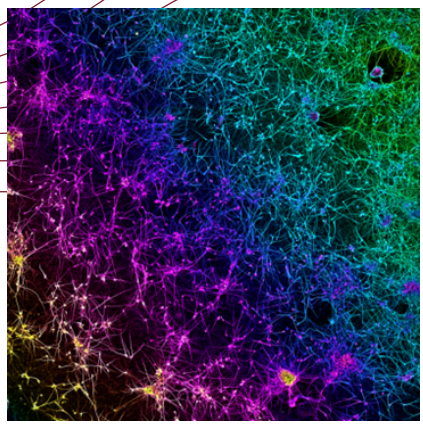
"My DPhil project, which explores the interaction between time perception and sleep homeostasis, has progressed steadily throughout my first year at the University of Oxford. I am grateful for the outstanding guidance from my supervisors, Professors Vladyslav Vyazovskiy, Linus Milinski, and Zoltan Molnar. Although my background is in psychology and cognitive neuroscience, I feel thoroughly integrated into the team. Professor Vyazovskiy consistently encourages me to leverage my unique perspective to contribute novel insights to the field. Beyond my research group, I am enriched by Oxford's incredible academic community. I am thrilled with my progress and deeply appreciate the support of the Kavli Foundation, which has made this invaluable experience and research possible."

Championing environmental sustainability: L.E.A.F

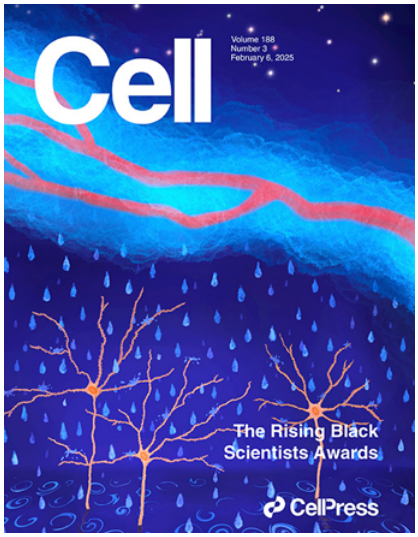
As testament to their commitment to progressing sustainability practices across our shared building, in the past year additional Kavli Oxford labs have secured or progressed their Laboratory Efficiency Assessment Framework (L.E.A.F) sustainability awards.

Gold	BIOCHEMISTRY: Matthew Higgins, Simon Newstead, Weston Struwe DPAG: Molly Stevens, Richard Wade-Martins (inclusive of Becky Carlyle, Hugo Fernandes, Brent Ryan, Mootaz Salman) NDCN: Kevin Talbot/Esther Becker (joint), George Tofaris CHEMISTRY: Carol Robinson (joint with Justin Benesch, Philipp Kukura, Andrew Baldwin)
Silver	BIOCHEMISTRY: Lindsay Baker, Simon Draper/Angela Minassian, Elena Seiradake, Nicole Zitzmann NDCN: Mark Hankins, Aarti Jagannath RDM/OCDEM: David Ray DPAG: Vladyslav Vyazovskiy
Bronze	PSYCHIATRY: Noel Buckley PHYSICS: Dominika Gruszka, Achillefs Kapanidis

Visualising science



Kavli Oxford's Nick Gatford Wins Image of Distinction Award in Nikon Small World Competition 2024
Considered the 'Oscars of microscopy', Nick's winning image shows a tiled network of dopaminergic neurons generated from human stem cells. Dopaminergic neurons are the main cell type that deteriorates in Parkinson's disease, and these cells are used to discover new pathways to prevent Parkinsonian degeneration.



On the cover: In issue of Cell, 6 February 2025, Natalie Hauglund et al identify norepinephrine fluctuations and vascular dynamics during NREM sleep as a key player in glymphatic clearance – and thereby the restorative function of sleep.
The cover image shows an artery with the perivascular space and cerebrospinal fluid depicted as a rain cloud dripping down on neurons in the shape of trees.

Image source: Natalie Hauglund and Nadia Alzoubi.
Natalie is a Novo Nordisk Foundation Post-Doctoral Research Fellow hosted in Kavli Oxford's Professor Vladyslav Vyazovskiy's group.

Collaboration in print
Selected publications highlighting Kavli collaborations

Structural biology and neurobiology informing a new target for pain
SLC45A4 is a pain gene encoding a neuronal polyamine transporter
https://pubmed.ncbi.nlm.nih.gov/40836097/

Collaboration within Kavli Oxford integrating clinical immunology and structural biology
Natural malaria infection elicits rare but potent neutralizing antibodies to the blood-stage antigen RH5 - https://www.cell.com/cell/fulltext/S0092-8674(24)00711-6

Physics and biochemistry come together to gain insight into ion channel gating
Structures of TASK-1 and TASK-3 K2P channels provide insight into their gating and dysfunction in disease – https://pubmed.ncbi.nlm.nih.gov/39637865/

A powerful interdisciplinary collaboration using mass photometry to understand SARS-CoV-2 cellular binding and inhibition
Oligomerisation-driven avidity controls SARS-CoV-2 cellular binding and inhibition
https://pubmed.ncbi.nlm.nih.gov/39298475/

Chemists interacting with biochemists to understand the effects of glycosylation and lipidation on drug binding
Defining proteoform-specific interactions for drug targeting in a native cell signalling environment – https://www.nature.com/articles/s41557-024-01711-w

KAVLI OXFORD SOCIAL & SPORT

Selected sporting achievements

Johanna Hofmann –
President of Oxford University Karate Club, Johanna was awarded the 'Most outstanding contribution to sport by Oxford University Sport Federation' on 16 June 2025. Johanna is completing her DPhil in the Richard Wade-Martins group.

Anis Sahoo –
Anis was the Winner of the Oxford 10K Race for Life, running in support of brain cancer research on 29 June 2025. Anis is a post-doctoral researcher in George Tofaris group, working on Parkinson's Disease.

Sophie Lawrence –
A long-standing member of the Oxford University Swimming Club, Sophie has been awarded her Oxford Swimming Full Blue for the 6th year running. Sophie was subsequently awarded The Vincent's William S. Broadbent Jnr. Scholarship. Sophie is completing her DPhil in the Carol Robinson group.

Social highlights

The Kavli Oxford aims to host a diversity of fun, social events for its members every year, and 2024-2025 saw the start of some firm favourites.

The winning pumpkin - Baldwin group

The October pumpkin carving competition was a great success, bringing Kavli members across all disciplines together to represent their science through beautifully-carved designs on pumpkins.

In June, around 30 members joined a first-time Kavli frisbee session, kindly co-run by Oxford University Ultimate (OW), and the joint Kavli-Biochemistry-DPAG Street Party saw scientists come together across departments for food, music and good conversation.

As Kavli Oxford continues to grow, we look forward to many more socials and events within our community.

Oxford Kavli in numbers

- £74 million new grant funding
- 48 funding bodies
- 595 staff and students
- 38 Principal Investigators and Group Leaders

We want to hear from you!

Keep contributing to growing Kavli Oxford - use the QR code to submit thoughts, ideas and suggestions of what you would like to see more of in Kavli Oxford.

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We are grateful for the continued support of our donors and partners. Your investment sustains the collaborative environment and bold science that define Kavli Oxford. If you are considering support, we invite you to explore opportunities.