

ANNUAL REPORT

JULY 1, 2021 - JUNE 30, 2022

2022



Introduction

This fiscal year's focus has been a combination of both planting roots within the University of Oxford and opening up our science to the world. In so doing we have been fostering the spirit of collaboration, development and excellence within the Kavli INsD community.

With the lifting of many Covid-19 restrictions we've been able to focus on what's been particularly important to us, building our community of Kavli members. The vision to create an environment that fosters not only advancements in science, but also kindness and collaboration has taken flight. All activities are put forward with the belief that cultivating our community is key to unlocking breakthroughs in science. Now that we're able to host events, seminars and discussions, we are moving to the next stages of creating the community we started to build in 2021 after the establishment of the Institute. This report will share some of the highlights and details of these activities.

Thank you again from all of us at Oxford for your partnership and support.

Within the Institute

Staff

Désirée Tennant – Organizational Development Business Partner

(desiree.tennant@medsci.ox.ac.uk)

Désirée remains a part of the administrative team in this newly developed role that was created to collaborate with members on ways to design and build our Institute's culture, stimulating frontier and cross disciplinary science. This role was created jointly by a successful grant application submitted by Carol Robinson and Désirée Tennant for a Culture Programme within the Kavli.

Işıl Şenol – Kavli Communications Officer

(isil.senol@medsci.ox.ac.uk)

Işıl, who originally started in the roll as temporary staff member, has joined us on a full-time basis working diligently on maintaining the ever-growing website, internal communication and events, as well as keeping the social media platforms up-to-date.

Samantha J. Salvatorelli – Business Manager

(Samantha.salvatorelli@medsci.ox.ac.uk)

Samantha returned from family leave to her full-time role as Business Manager at KINsD in March of 2021.

New Fellows

Dr Dominika Gruszka - Royal Society and Wellcome Trust Sir Henry Dale Fellow

Dominika joined Kavli INsD and the Department of Physics in March 2022. Dominika has been awarded a [Royal Society](#) and [Wellcome Trust](#) Sir Henry Dale Fellowship to investigate the molecular mechanisms of histone inheritance during DNA replication. She joined us from the [Francis Crick Institute](#) in London.

Dr Weston Struwe - UKRI Future Leaders Fellow at Kavli INsD

In December of 2021 we also announced that Weston joined the [Kavli INsD Team](#) as a [UKRI Future Leaders Fellow](#). Dr Struwe is one of eight Oxford University researchers to receive the award and the first in the Department of Chemistry.

Events

Kavli Research and Enterprise Discussion (K.R.E.D.) Series

To date the Kavli has had three K.R.E.D. speakers, but during this reporting year the inaugural seminar took place. On the 10th of March, 2022 Professor Randy Bruno, a professor of Neuroscience who recently joined the University of Oxford's Department of Physiology, Anatomy & Genetics gave a talk entitled: "[*The Many Layers of Cognition – and the many disciplines rallying to understand it*](#)".

Bruno, who came to Oxford from Columbia University's [Kavli Institute for Brain Science](#), also described how interdisciplinary collaborations in a Kavli Institute make it possible to address the complexity of systems like the cerebral cortex. His work involved geneticists, engineers, physicists, electrophysiologists and animal behaviourists.

Research Refresh Sessions

In-line with Kavli's coffee culture, on June 6th we started what we hope will be a lasting tradition at KINsD known as "Research Refresh". This is a daily 30-minute tea, coffee and light snack session held for the entire community – importantly without assigned seats or tables. These sessions have already created new introductions, initiated sharing of ideas and will no doubt result in new experiments and ground-breaking research.

Additionally, on Thursday's a pre-selected group of Post Doc's give a "3 min thesis". Standing before the community they give a 3 min. presentation without slides on their research.

Dr Kate Skinner from the Biochemistry Department commented on our Post Doc sessions:

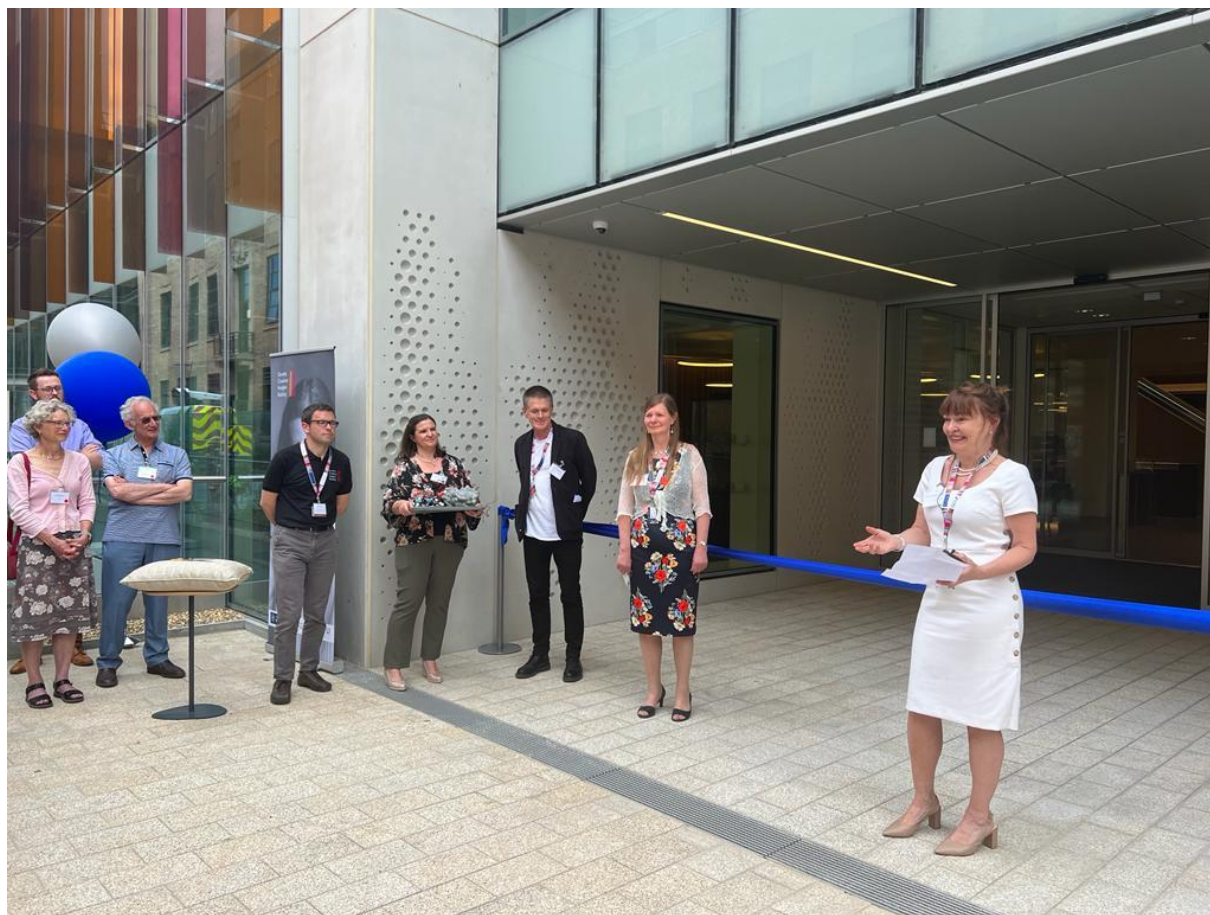
"I really enjoyed the postdoc events as the format is not something I have experienced before despite many years working in research! I loved the informal nature of it, how it fitted easily within the working day, and the bitesize introduction to a very broad range of interesting research projects. I can see it working very effectively to facilitate conversations between researchers that might not otherwise have happened. Thank you!"

Mass Photometry Symposium

In June 2022 KINsD hosted the world's first symposium for users of cutting-edge mass photometry technology – a novel approach to measure the mass of biomolecules that was developed by Kavli researchers. The event, which was hosted collaboratively with University of Oxford's spin-out company, Refeyn, brought together over 50 mass photometry users from diverse fields, representing 19 universities and companies. Participants had opportunities to discuss their work, share tips and ideas, and learn about the history of the technology and ongoing developments. The day involved presentations, posters, small-group discussions, lab demos and tours.

Opening of the Dorothy Crowfoot Hodgkin Building

On Wednesday the 15th of June the official opening of the Dorothy Crowfoot Hodgkin Building was underway. Home to the KINsD and Oxford's [Department of Biochemistry](#), the event started with speeches from Professor Francis Barr, Head of the Department of Biochemistry, Professor Dame Carol Robinson, Director of the Kavli Institute for Nanoscience Discovery, and Professor Elspeth Garman. After Professor Garman cut the ribbon to officially open the building, guests moved inside for a drink's reception followed by tours of the building.



Professor Dame Carol Robinson giving the opening speech besides Professor Francis Barr and Professor Elspeth Garman.

Milestones and achievements

For additional details on all of these milestones and achievements please visit our website:

www.kavlinano.ox.ac.uk

Five newly appointed Full Professors

In December of 2021, we were pleased to announce that five Kavli based academics were conferred with Full Professor titles. This recognition is for the significant and sustained academic contribution to the University of Oxford, based on research excellence and influence on fields of study, teaching and ‘good citizenship’.

- **Professor of Physical and Theoretical Chemistry**

Andrew Baldwin’s research focuses on using biomolecular NMR techniques to study the biophysical basis of function, and malfunction, of proteins in health and disease, in order to study the structure and dynamics of proteins, and relate this to their behavior in the cell.

- **Professor of Neuroscience and Neurology**

Zameel Cader’s research aims to further understand the disease pathways in neurogenetic disorders, often rare variants of common disease, and the development of new disease models for more effective drug discovery platforms.

- **Professor of Circadian Neuroscience**

Stuart Peirson’s research focuses on how light regulates physiology and behavior, with a particular interest in how our modern artificial light environment may disrupt these processes.

- **Professor of Neurology and Translational Neuroscience**

George Tofaris’ research aims to further delineate cellular pathways in protein quality control that could inform the development of novel biomarkers and targeted therapies in neurodegenerative and neurogenetic disorders.

- **Professor of Sleep Physiology**

Vladyslav Vyazovskiy aims to further understand the mechanisms governing the spatio-temporal dynamics of brain activity during sleep. This will help us to understand not only what sleep is, but also why it is necessary.

Robinson Group Awards

- “Multi-Channel Psych: Revealing Mechanisms of Anhedonia” – PI Carol V. Robinson, with Co-PIs Corinne Lutomski & Tarick El-Baba.
- Louis-Jeantet Prize for Medicine, Geneva, Switzerland
- Benjamin Franklin Medal in Chemistry, Philadelphia, PA. USA
- The Biophysical Society 2022 Class of Fellows. Carol V. Robinson Rockville, MD. USA
- University of Oxford’s Research Culture Enhancement Fund

Benesch Group Award

- BBSRC Frontier Research Grant – PI Prof. Justin Benesch

Kukura Group Awards

- The Emil Thomas Kaiser Award, Protein Society
- BBS Sosei Heptares Prize for Biophysics Society Award

Wade-Martins Group Awards

- Wellcome Trust Collaborative Award

Presenting to the World

Book

Life Time - [Professor Russell Foster](#)

Publications

JULY – AUGUST 2021

Parker, Joanne L., et al. "Structural basis of antifolate recognition and transport by PCFT." *Nature* 595.7865 (2021): 130-134. <https://doi.org/10.1038/s41586-021-03579-z>

Yang, Yun, et al. "The molecular basis of regulation of bacterial capsule assembly by Wzc." *Nature Communications* 12.1 (2021): 1-13. <https://doi.org/10.1038/s41467-021-24652-1>

Parker, Joanne L., et al. "Cryo-EM structure of PepT2 reveals structural basis for proton-coupled peptide and prodrug transport in mammals." *Science advances* 7.35 (2021): eabh3355. DOI: [10.1126/sciadv.abh3355](https://doi.org/10.1126/sciadv.abh3355)

SEPTEMBER – DECEMBER 2021

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Adams, Oliver, et al. "Cryo-EM structure and resistance landscape of *M. tuberculosis* MmpL3: An emergent therapeutic target." *Structure* 29.10 (2021): 1182-1191. <https://doi.org/10.1016/j.str.2021.06.013>

Bolla, Jani R., Francesco Fiorentino, and Carol V. Robinson. "Mass spectrometry informs the structure and dynamics of membrane proteins involved in lipid and drug transport." *Current Opinion in Structural Biology* 70 (2021): 53-60. <https://doi.org/10.1016/j.sbi.2021.03.014>

Conrad, Linus J., Peter Proks, and Stephen J. Tucker. "Effects of ionic strength on gating and permeation of TREK-2 K2P channels." *PloS one* 16.10 (2021): e0258275. <https://doi.org/10.1371/journal.pone.0258275>

Liebthal, Michael, et al. "Single molecule mass photometry reveals the dynamic oligomerization of human and plant peroxiredoxins." *Iscience* 24.11 (2021): 103258. <https://doi.org/10.1016/j.isci.2021.103258>

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Jiang, Cheng, et al. "Multiplexed profiling of extracellular vesicles for biomarker development." *Nano-Micro Letters* 14.1 (2022): 1-36. <https://doi.org/10.1007/s40820-021-00753-w>

Lalande, Emma, and Hafez El Sayyed. "Break-ups and make-ups: DNA search and repair." *Nature Reviews Microbiology* 20.2 (2022): 66-66. <https://doi.org/10.1038/s41579-021-00671-z>

Salter, Claire G., et al. "Biallelic PI4KA variants cause neurological, intestinal and immunological disease." *Brain* 144.12 (2021): 3597-3610. <https://doi.org/10.1093/brain/awab313>

Parker, Joanne L., et al. "Molecular basis for redox control by the human cystine/glutamate antiporter system xc⁻." *Nature communications* 12.1 (2021): 1-11. <https://doi.org/10.1038/s41467-021-27414-1>

JANUARY – APRIL 2022

Salman, Mootaz M., et al. "Recent breakthroughs and future directions in drugging aquaporins." *Trends in Pharmacological Sciences* 43.1 (2022): 30-42. <https://doi.org/10.1016/j.tips.2021.10.009>

Jin, Ruitao, et al. "Ion currents through Kir potassium channels are gated by anionic lipids." *Nature communications* 13.1 (2022): 1-11. <https://doi.org/10.1038/s41467-022-28148-4>

Patil, Dipak N., et al. "Cryo-EM structure of human GPR158 receptor coupled to the RGS7-Gβ5 signaling complex." *Science* 375.6576 (2022): 86-91. DOI: [10.1126/science.abl473](https://doi.org/10.1126/science.abl473)

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Xing, F., et al. "An In Vivo Fluorescence Resonance Energy Transfer-Based Imaging Platform for Targeted Drug Discovery and Cancer Therapy. *Front. Bioeng. Biotechnol.* 10: 839078. doi: 10.3389/fbioe.2022.839078." *Frontiers in Bioengineering and Biotechnology* | www.frontiersin.org 10 (2022). [10.3389/fbioe.2022.839078](https://doi.org/10.3389/fbioe.2022.839078)

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Espie, Colin A., Joseph Firth, and John Torous. "Evidence-informed is not enough: digital therapeutics also need to be evidence-based." *World Psychiatry* 21.2 (2022): 320. <https://doi.org/10.1002/wps.20993>

Asor, Roi, and Philipp Kukura. "Characterising biomolecular interactions and dynamics with mass photometry." *Current Opinion in Chemical Biology* 68 (2022): 102132.

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<https://doi.org/10.15252/embj.2021109990>

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Social Media



Understanding how social media today can play a key role in teaching, networking, connecting, inspiring, problem-solving and learning, we have been both diligent and deliberate about growing a variety of channels to share news and insight about the people and research happening at KINsD. You are now able to find us on Twitter, LinkedIn and YouTube. All channels are updated and monitored regularly, and continue to grow in both content and followers.