



THE GUY FOUNDATION

2025 SPRING SERIES PROGRAMME

All sessions 15:00hrs – 17:00hrs UK-time on Zoom

Water as a quantum biomolecule

In the Spring Series we will focus on the role that water plays in supporting and facilitating the processes fundamental to life. It is well accepted that water is integral to sustain living organisms. What is less well appreciated is the novel behaviour of water at its interface with biological materials. We will explore the physics of water in the biological context and to what extent quantum mechanics might be implicated.

Session 1: Wednesday 12 March

The physics of water in biology

Introduction: Professor Stan Botchway, Central Laser Facility, UKRI-STFC

Speaker: Dr Philip Kurian, Howard University

Session 2: Wednesday 26 March

The physics of water: charge, membranes and interactions with light

Introduction: Dr Betony Adams, The Guy Foundation and Stellenbosch University

Speaker: Dr Ali Hassanali, The International Center for Theoretical Physics, Trieste

Session 3: Wednesday 23 April

Quantum effects of water associated with proteins - the importance of order

Introduction: Dr Alix Bailie, Central Laser Facility, UKRI-STFC

Speaker: Dr Nathan Babcock, Howard University

Session 4: Wednesday 7 May

Origins of life: water, lights, action

Introduction: Dr Robert Fosbury, UCL and Emeritus Astronomer at the European Southern Observatory (ESO)

Speaker: Professor Alistair Nunn, The Guy Foundation and University of Westminster

Session 5: Wednesday 21 May

Implications of water as a quantum biomolecule for quantum biology research

Introduction: Dr Betony Adams, The Guy Foundation and Stellenbosch University

Followed by roundtable discussion among series speakers and participants

Subscribe to The Guy Foundation YouTube channel: <https://youtube.com/@theguyfoundation>

Register to attend the live meetings: email Nina Copping n.copping@theguyfoundation.org



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About the 2025 Spring Series

Water is central to life as we know it. Despite its deceptively simple structure, water has some very unusual physical properties, many of which are still being discovered. This makes its interaction with biological materials such as proteins and membranes complex in ways that are as yet not well understood. A number of previous Guy Foundation talks have alluded to questions about water, and it seems greater insight into the structure and function of this 'biological water' could be important to better understand how life works. As such the 2025 Spring Series aims to investigate water in the biological context by approaching it from several different angles.

The series begins with an introduction to the physics of water, and how this physics is important in biology. Water, for instance, has strong electrical properties, such as conductivity and polarity, making it an interesting medium in the context of bioelectricity, the importance of which we highlighted in the 2024 Autumn Series. The structure of water and the way that it is organised and ordered in the biological environment of the cell differs from bulk water in ways that may be essential for life and, indeed, may have facilitated the origins of life.

Water appears to play a pivotal role in enabling chemical reactions integral to biological processes. This is particularly interesting from a quantum mechanical point of view, and the series will explore the role that water plays in facilitating quantum tunnelling of both protons and electrons in enzyme reactions. The series will also explore how charge across a membrane – also known as a membrane potential, which is ubiquitous in biology – plays a role in controlling metabolism due to its effects on water in contact with the membrane.

Finally the series will address the interaction of light and water in the biological context. Both light and water play pivotal roles in biology, though their synergistic effects are less well documented. For instance it has recently been suggested the therapeutic effects of near infrared and infrared light, and the mechanism of action of photobiomodulation, are potentially due to interfacial water rather than light interacting with proteins directly.

Videos of the talks will be available on our website: <https://www.theguyfoundation.org/our-conferences-and-meetings/#2025Spring> and YouTube channel: <https://youtube.com/@theguyfoundation>.

About The Guy Foundation

The Guy Foundation is a UK-based charitable foundation established in 2018 to facilitate thinking and research on the role of quantum mechanics and thermodynamics in living systems, with the ultimate goal of using this understanding to advance healthcare. We curate, lead and fund an inter-disciplinary research collaboration and have published a number of scientific papers. We support the scientific community by convening online symposia on quantum biology and bioenergetics and we host an active network of over 200 scientists and institutions across the globe.

You can find more details on our website, including talks, publications and who we are:

<https://www.theguyfoundation.org/>

To register to attend the online lectures live on Zoom, contact n.copping@theguyfoundation.org

Previous speakers

Dr Betony Adams	Stellenbosch University and The Guy Foundation
Professor Margaret Ahmad	Sorbonne University
Dr Clarice Aiello	The Quantum Biology Institute
Professor Masashi Aono	Keio University
Dr Nathan Babcock	Howard University
Dr Wendy Beane	Western Michigan University
Dr Afshin Beheshti	University of Pittsburgh
Professor Jimmy Bell	University of Westminster; Scientific Advisor to The Guy Foundation
Professor Stanley Botchway	Central Laser Facility, UKRI; Scientific Advisor to The Guy Foundation
Dr Wolfgang Brysch	MetrioPharm AG
Dr Ed Calabrese	University of Massachusetts
Dr Michal Cifra	Czech Academy of Sciences
Dr Dave Ecker	Ionis Pharmaceuticals
Professor Matthew Fisher	University of California Santa Barbara
Professor Wayne Frasch	Arizona State University; Scientific Advisor to The Guy Foundation
Dr David Furman	Buck Institute for Research on Aging
Professor Michael Hamblin	University of Johannesburg
Dr Theodore Goodson	University of Michigan
Dr Lise Hébert	Picchio International
Professor Judith Klinman	UCLA Berkeley
Dr Philip Kurian	Howard University; Scientific Advisor to The Guy Foundation
Professor Nick Lane	University College London
Professor Mike Levin	Allen Discovery Center at Tufts University
Professor Johnjoe McFadden	University of Surrey
Dr Alasdair Mackenzie	Central Laser Facility, UKRI at the Harwell campus
Professor Joao Pedro Magalhaes	University of Birmingham
Dr Thomas H Marshburn	Sierra Space and retired NASA Flight Surgeon and Astronaut
Professor James Moon	Barts Heart Centre
Professor Karl Morten	University of Oxford
Dr Rhys Mould	University of Westminster
Professor Alistair Nunn	University of Westminster; Director of Science, The Guy Foundation
Professor Marco Pettini	Aix-Marseille University
Professor Martin Plenio	Ulm University
Dr Jan Pokorný	Czech Academy of Sciences
Professor Christopher D Porada	Wake Forest Institute for Regenerative Medicine
Dr Ken Raj	Altos Labs Cambridge Institute of Science
Professor Gregory Scholes	Princeton University
Professor Christoph Simon	University of Calgary
Dr Scott M Smith	Human Health and Performance Directorate, NASA Johnson Space Center
Steve Thorne	The Copernican Project
Professor Li-Heui Tsai	Picower Institute, MIT
Professor Jack Tuszyński	University of Alberta
Professor Gábor Vattay	Eötvös Loránd University
Brent Vaughan	Cognito Therapeutics
Professor Vlatko Vedral	University of Oxford
Professor Giuseppe Vitiello	University of Salerno
Professor Douglas C Wallace	The Children's Hospital of Philadelphia (CHOP)
Professor Steve Wedge	Cancer Research UK
Professor Jonathan Woodward	The University of Tokyo