



THE GUY FOUNDATION

2024 AUTUMN SERIES PROGRAMME

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

Genes and metabolism: bioelectricity and the quantum spark of life

In the Autumn Series we focus on the ways in which the more conventional viewpoints of biology intersect with each other, if we view life as being electric, and how the movement of fundamental particles that exhibit wave particle duality means thinking “quantum mechanically” may bring a new level of understanding.

Session 1: Wednesday 25 September

The life electric: the evidence

Introduction: Professor Jimmy Bell, University of Westminster

Speaker: Dr Michal Cifra, The Czech Academy of Sciences

Session 2: Wednesday 9 October

Electrical circuits in biology – quantum or classical?

Introduction: Betony Adams, The Guy Foundation and University of KwaZulu Natal

Speaker: Professor Gregory Scholes, Princeton University

Session 3: Wednesday 23 October

Putting the quantum into DNA and genetics

Introduction: Betony Adams, The Guy Foundation and University of KwaZulu Natal

Speaker: Professor John Joe McFadden, University of Surrey

Session 4: Wednesday 6 November

Why life is electrical – the flux capacitor

Introduction: Dr Rhys Mould, University of Westminster

Speaker: Professor Nick Lane, University College London (UCL)

Session 5: Wednesday 20 November

Bioelectricity and genetics

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

Speaker: Professor Michael Levin, Allen Discovery Center at Tufts University

Session 6: Wednesday 4 December

Roundtable meeting

Recap of the series talks and roundtable discussion among series speakers and participants

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

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



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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

About the 2024 Autumn Series

Improving medicine will require a deep understanding of the fundamental electromagnetic properties of biological systems. This is because life is defined by the dissipation of energy through the movement of fundamental particles, in particular, the flow of electrons that gives rise to ion gradients, with the best known being found in the mitochondrion. These ion gradients exist across all membranes in all kingdoms of life. To date, the best theory to explain their existence comes from the observation that they can be created, abiotically, in structures like alkaline thermal vents. In time, through the process of dissipative self-organisation, this gave rise to auto-catalytic networks that evolved into the recognisable biochemistry we now see.

At the most fundamental level, the movement of charge creates electromagnetic fields, while charge separation generates electric fields. Given that water and just about all molecules in life are charged, or can be influenced by charge – including membranes, this means that life is not just about its molecules, but the fields that are created as life dissipates energy. As it is now becoming clear that bioelectricity is determining the shape of life, as manipulation of ion channels can modify it, and thus, the distribution of larger ions, such as Na^+ , K^+ , Ca^{++} , Cl^- and HCO_3^- , it can be surmised that these fields hold information that determines biological outcomes – which potentially can be traced back to the origins of life itself.

It is possible that what might be termed “conventional” genetics came later, in effect, the metabolic first theory on the origins of life could be right. This is potentially important, as it means that the current focus on genetics, which eclipsed some of the earliest thinking that life was indeed electric, needs to be refined. At the deepest level, it means that it is very likely that to truly understand biology, we have to consider quantum mechanics; this is not a new idea, and through time, has been championed by Niels Bohr, Pascual Jordan, Erwin Schrödinger, Britton Chance, Roger Penrose and Herbert Fröhlich, among others.

In the 2024 Autumn Series we focus on the ways in which, if we view life as being electric, how the more conventional viewpoints of biology then intersect with each other, and critically, as it is all about the movement of fundamental particles that exhibit wave particle duality, thinking “quantum mechanically”, could bring us to a new level of understanding.

Previous speakers

Professor Margaret Ahmad	Sorbonne University
Dr Clarice Aiello	UCLA
Professor Masashi Aono	Keio University
Dr Nathan Babcock	Howard University
Dr Wendy Beane	Western Michigan University
Dr Afshin Beheshti	KBR at NASA Ames Research Center
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	Klox Technologies
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
Dr Alasdair Mackenzie	Central Laser Facility, STFC-UKRI, Harwell
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 Morton	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