



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: Dr 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: Dr 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](mailto: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](mailto: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  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{++}$ ,  $\text{Cl}^-$  and  $\text{HCO}_3^-$ , 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

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