MINI-SCHOOL

NITheCS
National Institute for
Theoretical and Computational Sciences

INTERNATIONAL YEAR OF
Quantum Science
and Technology

An Introduction to Quantum Biology

Dr Betony Adams (Stellenbosch University)

Attend online: Wed 7, 14, 21 & 28 May 2025 @ 14h00-15h00 SAST

ABSTRACT

Quantum biology is an exciting field of research with a pronounced interdisciplinary focus. The aim of the mini-school is to first address the miscommunications that might arise from this interdisciplinarity. The first lecture will begin with a short history of quantum biology before clarifying some of the important concepts in the field, from the point of view of both physics and biology. The second lecture will build on this by reviewing the different biological contexts in which quantum effects may play a role, which include photosynthesis, enzyme catalysis, DNA mutation, receptor binding, microtubule and mitochondrial function, magnetoreception, regulation of the production of ROS, calcium ion storage and release, and potentially, consciousness. The final lectures will focus on two different worked examples: a spin-based model of entangled neural activation by calcium phosphate molecules and a vibration assisted tunnelling model for the binding of the SARS-CoV-2 spike protein to its host cell.

BIOGRAPHY

Betony Adams is a postdoctoral researcher in the Quantum@SUN group at Stellenbosch University. She obtained her MSc and PhD in Theoretical Physics at the University of KwaZulu-Natal. Her thesis investigated whether quantum effects play a role in the brain, particularly how nuclear spin might play a role in neural activation and the mechanism of action of psychiatric therapeutics such as lithium. Betony also works in science communication for The Guy Foundation.

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NRF National Research Foundation

SA QuTI South African Quantum Technology Initiative

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