



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Natural and Agricultural Sciences

Department of Physics

Postdoctoral fellowship in experimental quantum optics

Topic: Photon correlation spectroscopy to probe quantum coherences in photosynthetic light-harvesting complexes.

The development of spectroscopic techniques for detection and verification of quantum coherence is a goal of increasing importance because of the growing progress of new quantum technologies, advances in the field of quantum thermodynamics, and the emergence of new questions in chemistry and biology regarding the possible relevance of quantum coherence in biochemical processes. Remarkably long-lived (660 fs to several ps) quantum coherences following excitation with an ultrashort, energetically broad laser pulse have been observed for various large photosynthetic light-harvesting pigment-proteins complexes. During the past 15 years, this phenomenon has been investigated extensively using two-dimensional electronic spectroscopy and various theoretical approaches, and it is believed to significantly enhance the organisms' biological functions. However, the origin of the coherences and their biological significance are still being debated, mainly due to the nature of the utilised experimental approaches giving rise to congested spectroscopic signals that are subject to ambiguous interpretations. In this project, quantum coherent couplings in three key photosynthetic pigment-protein complexes will be investigated using single-particle photon correlation spectroscopy, a relatively simple and inexpensive approach with the required sensitivity and selectivity to test current hypotheses about the existence and possible role of quantum coherences in these biological systems.

Amount: R200,000 p.a.

Duration: One year initially, which may be extended to a second year.

Starting date of fellowship: As soon as possible and before the end of 2021.

Application requirements: A detailed CV to be submitted to Prof. Tjaart Krüger at the University of Pretoria (tjaart.kruger@up.ac.za) no later than Sunday, 17 October 2021.

Please contact Prof. Krüger for any inquiries.