

Colloquium Notice

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Do Plant use Quantum Mechanics? Probably Not

Answering the titular question has become a central motivation in the field of quantum biology, ever since the idea was raised following a series of experiments demonstrating wave-like behavior in photosynthetic complexes. Here, we report a direct evaluation of the effect of quantum coherence on the efficiency of three natural complexes. An open quantum systems approach allows us to simultaneously identify their level of “quantumness” and efficiency, under natural physiological conditions. We show that these systems reside in a mixed quantum-classical regime, characterized by dephasing-assisted transport. Yet, we find that the change in efficiency at this regime is minute at best, implying that the presence of quantum coherence does not play a substantial role in enhancing efficiency. However, in this regime, efficiency is independent of any structural parameters, suggesting that evolution may have driven natural complexes to their parameter regime to “design” their structure for other uses.

Monday
March 22, 2021
Starts at 12:15 PM
zoom.us