IQSE AMO QO Seminar Series

Friday, March 24th, 11:30 am ZOOM & IQSE seminar room (MPHY 578)

Pizza will be served for IQSE members at 11:00 am. The talk will start around 11:30 am

Dr. Philip Kurian

(Howard University)

Ultraviolet superradiance from mega-networks of tryptophan in biological architectures

EVENT DETAILS: Networks of tryptophan – an aromatic amino acid with strong fluorescent response – are ubiquitous in biological systems, forming diverse architectures in transmembrane proteins, cytoskeletal filaments, sub-neuronal elements, photoreceptor complexes, virion capsids, and other cellular structures. We analyze the cooperative effects induced by ultraviolet (UV) excitation of several biologically relevant tryptophan mega-networks, thus giving insight into novel mechanisms for cellular signaling and control. Our theoretical analysis in the single-excitation manifold predicts the formation of strongly superradiant states due to collective radiative interactions among organized arrangements of up to more than 100,000 tryptophan UV-excited transition dipoles in microtubule architectures, which leads to an enhancement of the fluorescence quantum yield that is confirmed by our experiments. We demonstrate the observed consequences of this superradiant behavior for hierarchically organized tubulin structures in their fluorescence quantum yield, which increases in different geometric regimes at thermal equilibrium before saturation – highlighting the effect's persistence in the presence of disorder. In light of the data's strong indication of UV superradiance from such tryptophan mega-networks, potential applications for optical detection and discrimination of viral pathogens will be discussed.

ZOOM information:

https://tamu.zoom.us/j/98156251523?pwd=QVdSdGxtL1UyY0g1L083SU5QR0QrUT09

Meeting ID: 981 5625 1523
Passcode: 297578

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