

## World Congress on QUANTUM PHYSICS

November 24-25, 2022 | Webinar

**Charge transfer mechanisms in the DNA at finite temperatures****Rodrigo P. A. Lima***Federal University of Alagoas, Brazil*

We address various regimes of charge transfer in the DNA within the framework of the Peyrard-Bishop-Holstein model and analyze them from the standpoint of the characteristic size and time scales of the electronic and vibrational subsystems. It is demonstrated that a polaron is an unstable configuration within a broad range of temperatures and therefore polaronic contribution to the charge transport is irrelevant. We put forward an alternative fluctuation-governed charge transfer mechanisms and show that the charge transfer can be quasi-ballistic at low temperatures, diffusive or mixed at intermediate temperatures, and subdiffusive close to the DNA denaturation transition point. Dynamic fluctuations in the vibrational subsystem is the key ingredient of our proposed mechanism which allows for explanation of all charge transfer regimes at finite temperatures. In particular, we demonstrate that in the most relevant regime of high temperatures (above the aqueous environment freezing point), the electron dynamics is completely governed by relatively slow fluctuations of the mechanical subsystem. We argue also that our proposed analysis methods and mechanisms can be relevant for the charge transfer in other organic systems, such as, the conjugated polymers, molecular aggregates, etc

**Biography**

R. P. A. Lima has completed his PhD at the age of 29 years from Federal University of Alagoas (Brazil) and postdoctoral studies from New Mexico University (USA-2005), Universidad Complutense de Madrid (Spain 2006-2009), Warwick University (UK 2017) and more recently Technische Universität Kaiserslautern (Germany-2022). He is professor of physics at Universidade Federal de Alagoas since 2009. He has published more than 30 papers in reputed journals.