Texas Southern University

JOINT MATHEMATICS & PHYSICS COLLOQUIUM

NON-RELATIVISTIC FERMIONIC QUANTUM MECHANICS (CRACKING SCHRÖDINGER NUTSHELL)

Young Lee

Department of Physics, Texas Southern University
Young.Lee@tsu.edu

Tuesday, September 25, 2018
2:30 pm – 3:30 pm
Texas Southern University
Science Building, Room 146

Abstract

The non-relativistic Schrodinger equation was formulated nearly 90 years ago and has been successfully applied to various quantum mechanical systems across multiple scientific fields producing the main developments to quantum theory. The primary importance of Schrodinger's equation arises in the implementation of the analogue of Newton's law and continuation of classical mechanics. In the development of relativistic quantum physics, Dirac expanded the theory combining Einstein's special relativity, quantum mechanics and the so-called fermion particle of half integer spin. This was the first theory to consistently account for special relativity within the context of quantum mechanics. In this paper, we formulate a novel mathematical approach to solve Schrodinger's equation within the context of particle and wave theory. In our examination, we present a similar, yet unique model of fermion structure, which is consistent with the present day Dirac description. We will introduce and discuss the 1 dimensional structure of a Harmonic oscillator and free particle fermionic state. Additionally, the 3+1 dimensional structure of the fermionic state will be briefly outlined. Finally, we will compare our model with Dirac's theory for further study. This model is not Lorentz invariant; however, the connection of classical and non-relativistic quantum theory will be explained. We will also talk about the Hydrogen atom within the framework of bound state, fermionic quantum physics.