

Complex spin and anti-spin dynamics: A generalization of de Broglie–Bohm theory to complex space

Chaos, Solitons & Fractals, Volume 41, Issue 1, 15 July 2009, Pages 317-333

Ciann-Dong Yang

Abstract

To be consistent with the complex spacetime formulation of the $E(\infty)$ theory, we generalize the de Broglie – Bohm (dBB) theory to a complex domain and show that the complex-extended dBB trajectories solved from the plain Schro"dinger equation without any relativistic correction unambiguously demonstrate the existence of spin-1/2 dynamics in the ground-state hydrogen atom. It is the first time in the literature to reveal that to each spin solution to the Schro"dinger equation, there is an accompanying anti-spin solution such that the spin and anti-spin solutions constitute a complete solution to the Schro"dinger equation. The complex equations of motion indicate that the electrons in the spin and anti-spin solutions have equal angular momentum planck constant over two $\pi/2$ anti-parallel to each other.

Article Outline

1. Introduction
 2. Complex-extended Bohmian mechanics
 3. Spin dynamics
 4. Combined orbital and spin dynamics
 5. Total angular momentum operator
 6. Anti-spin dynamics
 7. Conclusions
- References