Unified Field Theory From The Classical Wave Equation – Connections To Classical Electrodynamics, To De Broglie's Relativistic Quantum Mechanics, And To Boscovich's Force

Héctor A. Múnera[1,2 a)]

[1]*International Centre for Physics (CIF, Centro Internacional de Física), Apartado Aéreo 4948, Edificio Manuel Ancízar, Ciudad Universitaria, Carrera 30 x Calle 45, Bogotá, Colombia, South America*
[2]*Retired professor, Department of Physics, Universidad Nacional de Colombia, Bogota, Colombia, South America.* [a)]*Corresponding author: hmunera@hotmail.com*

Abstract. This paper advocates a return to classical physics and postulates that our universe exists in an infinite, undeformable and flat three-dimensional Euclidean space, which is filled by a fundamental fluid formed by discrete structureless and three-dimensional energy-like objects (i.e., without rest mass) in permanent motion called sagions. Following Descartes and Einstein, neither force nor mass are primitive concepts, so that sagions are dynamically characterized by the linear momentum **P** that they carry relative to the said flat Eulidean space, and both the individual sagions and the collective sagionic fluid obey the two fundamental laws of classical physics: conservation of linear momentum and conservation of total energy. The fluid filling the whole universe is described by the homogeneous classical wave equation, which was Schrödinger's first candidate to develop quantum theory. The present author discovered twenty years ago two families of nonharmonic solutions (helicoidal and quingal) for the classical wave equation in spherical coordinates, geometry appropriate for our local region of the universe dominated by a central body. The present paper focusses on the quingal functions (Q-functions) which are inherently quantized, universal in the sense of being scale invariant, and isomorphic under both neo-Galilean and Lorentz transformations, thus providing for a viable development of a Lorentz-invariant quantum theory *ab initio*, as suggested long ago by Louis De Broglie. Scale invariance implies that quantization exists at all scales of the universe, from galactic clusters downwards to the sub-quark world. Q-functions are given in terms of the independent variable $q = Ct/r$, where r is distance, t is a Newtonian time, and C is the average local speed of sagions. This means that time and spatial distance are intimately mixed in the fundamental fluid (but not in the sense of Einstein's special theory of relativity), and it leads to two dual views of the sagionic fluid dynamics: (1) time-like representations when Q-functions are plotted against q, so than an observed at rest at position (r, θ, φ) sees a fluid transporting linear momentum at a finite speed. And, (2) space-like representations when Q-functions are plotted against $1/q$; in this view a far-away privileged observed at rest takes a snap-shot of the fluid, and sees at the same time different spatial regions of the fluid, thus mimmicking action-at-a-distance. In this manner, our fluid theory unexpectedly solves the long-lasting dichotomy between action-at-a-distance and propagation-at-a-finite-speed theories: they may peacefully coexist as dual views of the more general fluid theory. The dual representation of Q-functions is also compatible with some recent views propounding the validity of dual theories in classical electrodynamics. Finally, the space-like representation of Q- functions provides a long-wanted mathematical basis for Boscovich's action-at-a-distance force, that he claimed to be valid for all phenomena in nature; Boscovich force seems to be compatible with a lot of empirical evidence collected in the 20th century in a variety of fields covering the nuclear, atomic, molecular, macromolecular, and even gravitational scales.