

A local-realistic alternative to unification attempts between general relativity and quantum theory

Part 1. The case of rectilinear motion

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“The intellect seeking after an integrated theory cannot rest content with the assumption that there exist two distinct fields totally independent of each other by their nature” — A. Einstein, Nobel Lecture, 1923.

Abstract

We briefly review the current state of unification efforts between quantum field theory and general relativity theory, particularly quantum gravity (QG), and deformed special relativity (DSR) theories. We underscore theoretical and mathematical difficulties in such efforts and propose an alternative route to unity based on our recently proposed information relativity theory (IR) (Suleiman, 2016, 2018, 2019). In principle, IR is a local-realistic theory based on modifying Newtonian dynamics by accounting for the time delay in the travel of an information carrier from its source to a spatially separated receiver. Such modification results in relativizing Newtonian dynamics in a natural manner, without imposing constraints. In a recent paper (Suleiman, 2018), for the case of rectilinear motion, we derived the set of relativistic transformations between two reference frames. The resulting transformations are simple and beautiful; more importantly, they prescribe a matter-dark matter duality model for all moving bodies of mass, from small particles and atoms, to stellar and galactic structures. They also predict and explain the “smearing” of photons and electrons along their paths as well as a multitude of physical phenomena at all scales, including the so-called “time dilation” of decaying muons, the results of several recent neutrino velocity experiments, quantum criticality, and particle diffraction in the double-slit experiment. In cosmology, the same set of transformations predict and explain the GZK cutoff limit to the cosmic-ray energy

spectrum and the coincidence problem. It also suggests an intriguing inference about the nature of dark energy, being the energy of the intergalactic dark matter of the receding universe. Extension of the theory to rectilinear motion with gravitational acceleration reproduces the predictions of general relativity theory for astrophysical phenomena, light-bending, and gravitational redshift and explains the Pioneer anomaly. At quantum scales, the theory predicts and explains the strong force and the phenomena of confinement and asymptotic freedom. We conclude by comparing IR with SR, DSR, quantum gravity, and MOND and by pointing out its possible extensions.

Keywords: Newtonian dynamics, special relativity, general relativity, quantum theories, unification theories, quantum gravity, dark matter, matter-dark matter duality, light bending, gravitational redshift, pioneer anomaly, GZK cutoff limit, golden ratio.

References

Suleiman, R. Information relativity theory solves the twin paradox symmetrically, *Physics Essays*, 29, 304-308 (2016).

Suleiman, R. A model of dark matter and dark energy based on relativizing Newton's physics. *World Journal of Condensed Matter Physics*, 8, 130-155 (2018).

Suleiman, R. *Relativizing Newton* (Nova Science Publishers. N.Y, 2019).