Unification of Quantum Mechanics and General Relativity: Geometrical Nature of Matter and Multiple Levels of Universes

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There is a background of matter and geometry (tempo-spatial points) on which both quantum mechanics and general relativity rely. I refer to this background as geometro-matter background. Quantum mechanics focuses on measuring the state functions of this background matter (e.g. in the form of a particle such as an electron) at these background spatial-temporal geometrical points or locations. General relativity on the other hand focuses on measuring the curvatures that this background matter causes at these background spatial-temporal geometrical locations.

I'll propose that an important key step towards the unification of quantum mechanics and general relativity is to revisit this geometro-matter background and redefine the relationship between matter and geometry. I'll introduce a new notion of space-time-matter where matter is baked into geometry itself as a new geometrical dimension. I'll also quantize space-time-matter and introduce Space-Time-Matter (STM) quanta as a geometrical quantum. A STM is nothing but an event point which has space, time, and matter dimensions due to the uncertainty principle, i.e. a STM is a blend of space, time, and matter. I'll propose that the state functions of STMs cause space-time-matter curvatures.

I'll then propose that every object in the Universe, e.g. a particle such as an electron or cosmological object such as a black hole is a composite quantum system that consists of a cluster of entangled STMs. Therefore every object is in an entangled quantum state. This also means that every object in the Universe is a blend of space, time, and matter.

I'll then present my new quantum field equations for the state function of a STM and my new general relativity field equations that show how this STM state function curves spacetimematter. My new quantum field and general relativity field equations provide the first important step in unifying quantum mechanics and general relativity and the four fundamental forces of nature.

I'll then deep dive into the probabilistic world of quantum mechanics to uncover underlying levels of state functions and then deep dive into the spatial-temporal-matter world of general relativity to uncover underlying levels of space-time-matters and their STMs, curvatures, metrics, and line elements.

Let me use an example to introduce state function levels. Imagine you're having the following conversation with a friend. "Are you sure about that?" he asks. "I'm 30% sure" you reply. "How sure are you about that 30%?" he replies back. Your and his replies are at two different levels. Your reply is at the level of probability (or state function) and his reply is at a higher level, i.e. at the level of probability of probability (or state function of state function).

I refer to your level as the first level of state functions and his level as the second level of

state functions. The overall or combined state function in this case must take state functions of both levels into account. Obviously, other levels of state functions, e.g. third, fourth, fifth, etc. can also be introduced. I'll then show that every state function level has a spatial-temporal-matter geometrization turning it into a five dimensional geometry that has its own space, time, and matter dimensions and its own STMs. This allows me to represent each state function of a given state function level as spatial-temporal-matter positioning of a STM in the respective geometry. This also allows me to present the overall or combined state function as the entangled state function of a cluster of entangled STMs where these STMs come from multiple levels of state functions.
This also means that there are multiple levels of geometries or space-time-matters where each level of space-time-matter is the spatial-temporal-matter geometrization of a given state function level. Every level of geometry and its STMs, curvatures, metric, and line elements form a universe of its own. The Universe is fundamentally multi-universe.

This also means that the matter and energy content of the Universe composes of not only ordinary matter and energy that the zeroth level of universe (our ordinary universe) contributes but also non-ordinary matter and energy that all levels of universes contribute. I propose that these non-ordinary matter and energy contributions of all levels of universes form what is known as the dark matter and dark energy. My approach to quantum gravity therefore provides a new approach to the physics of the dark matter and dark energy.

I'll propose that the Universe is a world of multi-universe entities such as multi-universe metric tensor components and multi-universe line elements. A multi-universe metric tensor component is an entangled metric tensor component state function. An multi-universe line element is an entangled line element state function.

I'll present a new approach to quantum gravity that includes new quantum field equations for the state function of a STM of a given level of universe and new general relativity field equations for the curvatures that this state function causes in the respective level of space-time-matter. I'll show how these new quantum and general relativity field equations together unify quantum mechanics and general relativity and the four fundamental forces of nature and provide a new approach to the physics of the dark matter and dark energy. I'll also use my approach to quantum gravity to derive Hawking entropy and temperature, to add higher order corrections to them, and to extend them to non-black hole space-time-matter regions in addition to black holes. I'll also introduce concepts such as complex and negative masses and gravity and geometrical quantum tunneling among multiple levels of universes and provide quantum mechanism for physical phenomena such as black holes, dark matter, dark energy and the accelerating expansion of the Universe. I'll also show how my new approach to quantum gravity resolves the black hole information paradox.