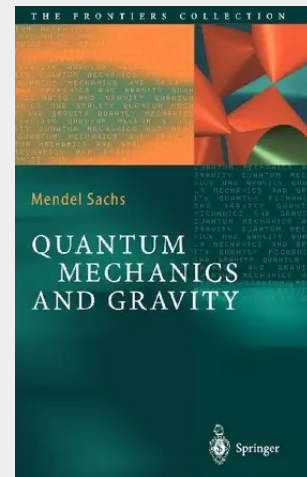


Quantum Mechanics and Gravity

Quantum Mechanics and Gravity describes a paradigm change in modern physics from the philosophy and mathematical expression of the quantum theory to those of general relativity. This approach applies to all domains - from elementary particles to cosmology; the change is from the positivistic views in which atomism, nondeterminism and measurement are fundamental, to a holistic view in realism, in which matter - electrons, galaxies - are correlated modes of a single continuum, the universe. It explicitly defines the field that unifies electromagnetism, gravity and inertia, with new predictions, in terms of quaternion and spinor field equations in a curved spacetime. This unified field theory is derived from first principles in the sense of Einstein's continuum field theory in general relativity, in contrast with the attempted unification in the context of the quantum theory (called the "Grand Unified Theory" – GUT). Quantum mechanics emerges as a linear, flat space approximation for the equations of inertia in general relativity.

Theoretical physics is presently at a very exciting time in the history of scientific discovery. For we are at a precipice facing two conflicting 20th century revolutionary movements in physics, each purporting to be basic truths of nature - the quantum theory and the theory of relativity. In the 20th century the mathematical expression of the quantum theory yielded correct predictions of a great deal of the data on the behavior of the molecular, atomic, nuclear and elementary particle domains of matter. In the same period, the theory of relativity successfully described new features of material systems. In special relativity, the relativistic Doppler effects (transverse and longitudinal) of electromagnetic radiation, and the mechanics of matter that moves at speeds close to the speed of light, revealing, for example, the energy mass relation, $E = mc^2$, revolutionized our thinking. In its form of general relativity, it has yielded a formalism that successfully predicted features of the phenomenon of gravity, also predicted by the classical Newtonian theory, but in addition, features not predicted by the classical theory, thereby superseding Newton's theory of universal gravitation. The problem we are now faced with, in these early decades of the 21st century, is that in their precise mathematical forms and their conceptual bases, the theory of relativity and the quantum theory are both logically and mathematically incompatible.



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