Prof. Gerard 't Hooft (Utrecht University) The Quantum General Relativity and Determinism

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Quantum Mechanics is the pillar of modern theoretical physics, on which all dynamical laws of subatomic particles, fields and forces are based. Taking its two ingredients together, being the Schroedinger equation and the description of the measuring process, this theory appears to have an undeniable `stochastic' element, precluding the possibility of `certainty' in a prediction, and denying any description of an ontological `reality' underlying the observed phenomena.

In the world of atoms, molecules and fundamental particles, this may be a fact of life that we have to live with, given the successes of Quantum Mechanics, but when we try to formulate theories for curved space-time and for the entire the cosmos, that should at least in principle account for all physical phenomena with infinite precision, this situation is unsatisfactory. We propose to search for a deterministic theory underlying both General Relativity and Quantum Mechanics. The mathematics of Quantum Mechanics appears to allow for this; there are intriguing possibilities, as explained in the lecture.

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