

Physics and the GUT

Einstein was not content with his two relativity theories; he wanted to expand his general theory to include Maxwell's Equations. For the last 20 years of his life, he secluded himself in a modest house in Princeton NJ, devoting all his energy to try to write an equation that united gravity and EM. He failed, but the quest for a Grand Unified Theory was now becoming a major scientific preoccupation.

Physicists have come to understand that the known universe is governed by the four forces of gravity, electromagnetism, and the weak and strong nuclear forces. The strong nuclear force holds the protons and neutrons of the nucleus together; the weak nuclear force allows neutrons to turn into protons, giving off radiation in the process. The atomic bomb releases the power of the strong nuclear force.

The EM force is billions and billions of times stronger than the force of gravity. That's why the atoms of earth or concrete stop an object which is falling due to the force of gravity.

Physicists since Einstein have been trying to understand gravity, and to reduce the expressions for the four forces of the universe in a single equation.

By the 1950s, Richard Feynman, Julian Schwinger, Sin-Itiro Tomanaga and Freeman Dyson had laid the foundation for a synthesis of Special relativity and QM called Quantum Field Theory.¹

Quantum-Electro-Dynamics (QED) describes electromagnetic activity in terms of virtual messenger photons. It allows a procedure for calculating the results of any interaction between photons and electrons, however complicated. This theory is consistent with the principles of both quantum theory and relativity theory.

Kusla Klein theory unifies Maxwell's Theory of Electromagnetism and Einstein's General Theory of Relativity (Gravity).

ⁱ *The Black Hole War* by Leonard Susskind p. 7.