

Einstein: From Unification Theory to Relativity and Back Again

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Einstein's Time Frame:

Special Relativity 1897 - 1908

General Relativity 1907 - 1918

Unified Field Theory 1919 - 1955

Special Relativity

Special Relativity unified the electric and magnetic fields into the electromagnetic field. Einstein was disturbed that the "ether" concept required that Maxwell's laws worked differently for different observers. He postulated that there is no ether, and that fields can exist in empty space. The electromagnetic field breaks into different components for different observers. These consequences led to his conclusions on the nature of space and time.

General Relativity

The gravitational field has only a relative existence. There is no gravity for a body in free fall. Hence, the inertio-gravitational field splits differently for different observers. The twin paradox and the rotating water bucket thought experiments are consequences of this. Mach's Principle states that all inertio-gravitational fields must be completely determined by matter. Einstein accepted this. However, a counter-example was offered by de Sitter. After trying to disprove the counter-example for some time, Einstein finally accepted that it was correct, and abandoned Mach's Principle in 1918.

Unified Field Theory

Einstein began work on the Unified Field Theory in 1919, in an attempt to unite the electromagnetic and inertio-gravitational fields. He did not succeed before his death in 1955.