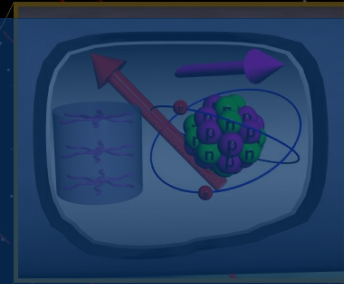


Beyond Einstein: The Search for Relativity Violations



Alan Kostelecky
Distinguished Professor, Physics



CURRENT RESEARCH

Searching for changes to the fundamental theories of physics

Physicists have sought to describe the fundamental laws of the universe for centuries. At present, the best existing description of these laws involves two independent theories, Einstein's General Relativity for gravity and the Standard Model for quantum physics. A central problem, currently unsolved, is to unify the two. To achieve this unification, scientists expect that modifications must be made to one and perhaps both of the existing theories. Dr. Alan Kostelecky, of Indiana University, is a theoretical physicist who investigates modifications that involve tiny changes in the laws of relativity. These changes, known as relativity violations, could revolutionize theoretical physics and lead to significant changes to our understanding of the universe.

More specifically, Dr. Kostelecky pioneered the idea that there may be tiny deviations from the accepted laws of relativity. His research shows that these relativity violations could emerge from a fundamental theory unifying gravity with quantum physics such as string theory. His comprehensive theoretical framework, known as the Standard-Model Extension (SME), is widely used for studying physics beyond Einstein's relativity. The SME has led to many new experimental tests of Special and General Relativity. Dr. Kostelecky's research has a unique scope and eclectic nature, ranging from formal physics and mathematics to analyzing experiments. Scientists around the world use techniques from many subfields of physics to explore his ideas, leading to an exceptionally rapid rate of experimental advances. His research also has philosophical roots. For example, the foundation of Einstein's relativity is an elegant and perfect symmetry of spacetime called Lorentz...

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AFFILIATION

 Indiana University Bloomington

EDUCATION

- Ph.D., in Physics, 1982
Yale University
- B.Sc., 1st class in Physics, 1977
University of Bristol

RESEARCH AREAS

Technology, Space, Computational Sciences / Mathematics, Materials Science / Physics

FUNDING REQUEST

Your contributions will support the research of Dr. Alan Kostelecky at Indiana University as he studies the fundamental laws that dictate the universe. Your donations will help cover the annual \$50k-250k needed to support crucial personnel and the \$10k-30k for the scientific meetings to continue rapid advances. By donating, you will help scientists explore physics beyond Einstein's relativity and be part of the extraordinary human quest for a deeper understanding of the founding laws of our universe.

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