



# CPT and Lorentz Symmetry

*Alan Kostelecky*

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This book contains the Proceedings of the Sixth Meeting on CPT and Lorentz Symmetry, held at Indiana University in Bloomington on June 17–21, 2013. The Meeting focused on tests of these fundamental symmetries and on related theoretical issues, including scenarios for possible violations.

Topics covered at the meeting include searches for CPT and Lorentz violations involving: accelerator and collider experiments; atomic, nuclear, and particle decays; birefringence, dispersion, and anisotropy in cosmological sources; clock-comparison measurements; electromagnetic resonant cavities and lasers; tests of the equivalence principle; gauge and Higgs particles; high-energy astrophysical observations; laboratory tests of gravity; matter interferometry; neutrino oscillations and propagation; oscillations and decays of neutral mesons; particle–antiparticle comparisons; post-newtonian gravity in the solar system and beyond; second- and third-generation particles; space-based missions; spectroscopy of hydrogen and antihydrogen; spin-polarized matter; and time-of-flight measurements. Theoretical discussions include physical effects at the level of the Standard Model, General Relativity, and beyond; the possible origins and mechanisms for Lorentz and CPT violations; classical and quantum issues in field theory, particle physics, gravity, and string theory; and mathematical foundations including Finsler geometry.

### Contents:

- Bounds on LLI Violation and Long-Range Spin-Spin Interactions Using Hg, Cs, and the Earth (*L R Hunter et al.*)
- Antihydrogen, CPT, and Naturalness (*M C Fujiwara*)
- Probing Physics Beyond the Standard Model with He/Xe Clock Comparison Experiments (*F Allmendinger et al.*)
- Using Binary Pulsars to Test Lorentz Symmetry in the Gravitational Sector (*J M Weisberg*)
- Relevance and Prospects of Magic Telescope Gamma-Ray Observations for Lorentz Symmetry Tests (*R M Wagner*)
- Testing Periodic Local Position Invariance Using Long-Term Comparison of the SYRTE Atomic Fountains and H-Masers (*M E Tobar et al.*)
- An Odd (Parity) Test of Lorentz Symmetry with Atomic Dysprosium (*N Leefer and M Hohensee*)
- The Search for Neutrino–Antineutrino Mixing from Lorentz-Invariance Violation Using Neutrino Interactions in MINOS (*S Mufson and B Rebel*)
- Higher-Order Lorentz Violation (*M Mewes*)
- Tests of Lorentz Invariance Using High-Energy Astrophysics Observations (*F W Stecker*)
- The KATRIN Experiment: Status and Outlook (*D S Parno*)
- Status of Matter-Gravity Couplings in the SME (*J D Tasson*)
- Search for CPT and Lorentz Symmetry Violation in Neutral Kaons at KLOE/KLOE-2 (*A De Santis*)
- Neutrino Velocity Measurements with MINOS (*I Anghel*)
- Lorentz-Violating Photons with a Mass Term (*M Cambiaso, R Lehnert, and R Potting*)
- Covariant Photon Quantization in the SME (*D Colladay*)
- and other papers

**Readership:** Researchers in theoretical physics, high energy physics/particle physics, atomic physics,

astrophysics, astronomy, cosmology and classical mechanics/electrodynamics.

**Key Features:**

- No competing titles: the book is a unique summary in the field of searches for relativity violations
- This is the 6th volume in the series
- Prominent contributors include leading scientists performing experimental tests of CPT and Lorentz symmetry, such as: Larry Hunter (Amherst), Anna Nobili (Pisa), Hans Wilschut (Groningen), Michael Tobar (Western Australia), Henric Krawczynski (Washington U), Stephan Schiller (Duesseldorf), Holger Mueller (Berkeley), Gerald Gwinner (Manitoba), Achim Peters (Humboldt), Antonio De Santis (Rome), Michael Romalis (Princeton), Leo Hollberg (Stanford)

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