



Theory Seminar

“(Why) Is Helicity Lorentz-Invariant? Part 1: Introduction”

Massless particle states carry integer or half-integer spin about the momentum axis, or "helicity". Lorentz symmetry allows for helicity states to mix under boosts (like massive particle polarizations); such mixing is not understood theoretically and is not obviously well constrained by experiment. This possibility is historically known as "continuous spin" and this talk provides an informal introduction to the subject. We present evidence that "continuous spin" particles (CSPs) can interact with matter via scattering amplitudes that approach familiar scalar, electromagnetic, or gravitational ones in a high energy (and/or non-relativistic) correspondence limit. Such interactions also appear thermodynamically safe.



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This talk will focus on the motivation for CSPs, their kinematics, and properties of consistent amplitudes. We close by identifying some directions for discovering a full interacting theory of CSPs or proving that such theories can't exist. A 2nd talk on Tuesday will elaborate on CSP thermodynamics and on a field theory description of CSPs.