

Abstract Submitted
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Derivation of Einstein–Cartan theory from general relativity

RICHARD PETTI, Retired — General relativity cannot describe exchange of classical intrinsic angular momentum and orbital angular momentum. Einstein–Cartan theory fixes this problem in the least invasive way. In the late 20th century, the consensus view was that Einstein–Cartan theory requires inclusion of torsion without adequate justification, it has no empirical support (though it doesn't conflict with any known evidence), it solves no important problem, and it complicates gravitational theory with no compensating benefit. In 1986 the author published a derivation of Einstein–Cartan theory from general relativity, with no additional assumptions or parameters. Starting without torsion, Poincaré symmetry, classical or quantum spin, or spinors, it derives torsion and its relation to spin from a continuum limit of general relativistic solutions. The present work makes the case that this computation, combined with supporting arguments, constitutes a derivation of Einstein–Cartan theory from general relativity, not just a plausibility argument. This paper adds more and simpler explanations, more computational details, correction of a factor of 2, discussion of limitations of the derivation, and discussion of some areas of gravitational research where Einstein–Cartan theory is relevant.

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