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The effects of intrinsic spin of matter in relativistic cosmology

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We discuss general solutions of the Einstein-Cartan theory sourced by a cosmological perfect fluid composed of particles with intrinsic spin. In the considered model, the metric tensor is described by a general FLRW solution, however, the Weyl tensor might not vanish. The coupling between the intrinsic spin and the Weyl tensor excludes spatially closed solutions, and the universe must either be flat or open. In the open case, it is shown that the magnetic part of the Weyl tensor verifies a wave equation, such that, in a dynamic universe, the intrinsic spin of matter leads to the generation and emission of gravitational waves. The properties of these waves are discussed, with an emphasis on their decay rate at late time. Lastly, we discuss that, in the considered cosmological model, the intrinsic spin of matter contributes to a positive accelerated expansion of the universe.

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