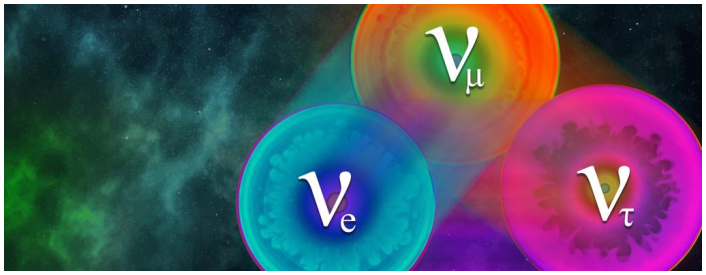

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The 3+1 formalism in teleparallel theories of gravity

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We present recent advancements in the 3+1 formalism within two reformulations of general relativity: the teleparallel equivalent, and the symmetric teleparallel equivalents of general relativity. Both theories are based on the torsion and nonmetricity of a flat linear connection, respectively, and their Lagrangians are expressed in terms of the torsion scalar T and nonmetricity scalar Q. These scalars differ from the Ricci scalar R of general relativity by boundary terms. The bulk equations of motion in these theories are equivalent to those of Einstein's gravity; however, equations of motion that present a different gauge evolution for the lapse and shift can be obtained from integration by parts of the boundary term in the 3+1 Lagrangian or the Hamiltonian. We investigate the impact of these choices in Hamilton's equations, hyperbolicity properties, and their consequences in a numerical relativity framework.

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