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The Spin(p, q) Invariant Dirac Equation in n+1 dimensional Curved Spacetime KEITH ANDREW, ERIC STEINFELDS, ARMIN SMAILHODZIC, Western Kentucky University — The curved spacetime Dirac equation has a spin connection that in general requires an extra constraint to obey the strong equivalence principle. When the spacetime manifold (M,g) is the base space for a spin bundle and the spinors are representations of a Clifford algebra contained in Spin(p,q) the covariant derivative of the Dirac equation has a spin connection added to the partial derivative. In the vielbein formalism local tetrads are explicitly added to the covariant derivative to give the Dirac-Fock-Weyl spin 1/2 equation in curved spacetime. Alternatively by coupling to the gravitational field with scalar curvature R a variation to the Dirac equation with spin connection can be derived that obeys the strong equivalence principle with spacetime dependent Dirac matrices that fix the form of the spin connection. In both cases the product of the Dirac equation yields a curved spacetime version of the Klein-Gordon equation. Here we develop a procedure to identify the spin connection and examine separable solution constructions for spin 1/2 particles in a general curved spacetime for both types of spin connection in the Dirac equation.

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