

Hilbert-Einstein Lagrangian on a Generalised Frame Bundle

Einstein's equation can be obtained as the Euler-Lagrange equation associated to the Hilbert-Einstein Lagrangian, which is essentially the scalar curvature. The curvature tensor, and therefore Einstein's equation, can be formulated and studied on the frame bundle of spacetime. We will introduce a Lagrangian defined on a 10-manifold such that the solutions to the Euler-Lagrange equations equip the manifold with a structure which is almost that of the frame bundle of an Einstein manifold. This will lead us to introduce a structure which generalises that of a frame bundle provided with a principal connection.

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