

Abstract Submitted
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Geometrization of Electromagnetism in Purely Affine and Metric-Affine Gravity NIKODEM POPLAWSKI, Indiana University — The purely affine Lagrangian for linear electrodynamics, that has the form of the Maxwell Lagrangian in which the metric tensor is replaced by the symmetrized Ricci tensor and the electromagnetic field tensor by the tensor of homothetic curvature, is dynamically equivalent to the Einstein-Maxwell equations in the metric-affine and metric formulation. We apply to a purely affine Lagrangian the Legendre transformation with respect to the tensor of homothetic curvature to show that the corresponding Legendre term and the new Hamiltonian density are related to the metric-affine Maxwell-Palatini Lagrangian for the electromagnetic field. Therefore the purely affine picture, in addition to generating the gravitational Lagrangian that is linear in the curvature, justifies why the electromagnetic Lagrangian is quadratic in the electromagnetic field.

Nikodem Poplawski
Indiana University

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