

Area metric actions and the Barbero-Immirzi parameter

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Area metrics generalize spacetime geometry based on lengths and provide a candidate parametrization of the extended configuration space of loop quantum gravity and spin foams in the semiclassical regime. On this basis, I will consider generally covariant actions to second order in area metric fluctuations and derivatives. The effective actions for the subset of area metric degrees of freedom associated with length metric fluctuations, feature nonlocal corrections quadratic in the Weyl curvature, beyond the Einstein-Hilbert term. For a two-parameter subclass of area metric Lagrangians, the effective graviton propagator remains ghostfree. Strikingly, in the framework of area metric actions from modified non-chiral Plebanski theories, these two parameters can be identified with the parity-breaking Barbero-Immirzi (BI) parameter and the mass of the non-length degrees of freedom of the area metric. The classical dynamics of area metrics is characterized by a mixing of polarizations for the massless spin-2 mode and thereby paves the way for area metric phenomenology and experimental measurements of the BI parameter.

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