

Remarks on Gauge Invariance and First-class Constraints

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Abstract

Gauge symmetries lead to first-class constraints. This assertion is of course true only for non trivial gauge symmetries, i.e., gauge symmetries that act non trivially on-shell on the dynamical variables. We illustrate this well-appreciated fact for time reparametrization invariance in the context of modifications of gravity – suggested in a recent proposal by Hořava – in which the Hamiltonian constraint is deformed by arbitrary spatial diffeomorphism invariant terms, where some subtleties are found to arise.