

Theory: On the classification of Generalized Quasitopological Gravities

Monday, September 4, 2023 2:30 PM (15 minutes)

Generalized Quasitopological Gravities (GQTGs) are higher-order extensions of Einstein gravity in D dimensions satisfying a number of interesting properties, such as possessing second-order linearized equations of motion on top of maximally symmetric backgrounds, admitting non-hairy generalizations of the Schwarzschild-Tangherlini black hole which are characterized by a single metric function or forming a perturbative spanning set of the space of effective theories of gravity. In this work, we classify all inequivalent GQTGs at all curvature orders n and spacetime dimension $D \geq 4$. This is achieved after the explicit construction of a dictionary that allows the uplift of expressions evaluated on a single-function static and spherically symmetric ansatz into fully covariant ones. On the one hand, applying such prescription for $D \geq 5$, we find the explicit covariant form of the unique inequivalent Quasitopological Gravity that exists at each n and, for the first time, the covariant expressions of the $n-2$ inequivalent proper GQTGs existing at every curvature order n . On the other hand, for $D=4$, we are able to provide the first rigorous proof of the fact that there is one and only one (proper) inequivalent GQTG at each curvature order n , deriving along the way a simple expression for such four-dimensional representative at every order n .

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