

Local and Non-Local Conservation Laws for Quadratic Constrained Lagrangians and Applications to Cosmology

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ABSTRACT

In this work we study the conditions for the existence of conservation laws in constrained systems described by quadratic Lagrangians. Apart from the variational symmetries, leading to local integrals of motions, the parametrization invariance of such systems can be exploited to construct non-local conditional symmetries. That is, integrals of motions that exist on the constrained surface. The use of the previous mentioned symmetries can help in integrating various systems in cosmology, where these Lagrangians emerge from a mini-superspace description. At the same time, the local expressions can be used in a canonical quantization procedure by defining eigen-equations as supplementary conditions to the Wheeler-DeWitt equation.