Formal aspects of cosmological models: higher derivatives and non-linear realisations

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Propositions accompanying the PhD thesis

'Formal aspects of cosmological models: higher derivatives and non-linear realisations'

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1. Transformations involving derivatives naturally appear when dealing with higher derivative theories and/or non-linearly realised space-time symmetries. [*Chapter 2*]

2. Ostrogradsky's theorem strongly restricts the appearance of higher derivatives in potentially viable physical models. [*Chapter 3*]

3. Healthy higher derivative theories can be classified according to the complexity of their constraints, namely trivial, linear or non-linear. [*Chapter 4*]

4. Large classes of healthy higher derivative theories can be put in a manifestly healthy first order form by performing suitable (derivative dependent) redefinitions of the fields, but doing so generically obscures other properties (such as symmetries) of the theory. [*Chapter 4*]

5. The existence of inverse Higgs constraints complicates the universality question for non-linear realisations of space-time symmetries; a thorough investigation of transformations involving derivatives might offer a solution. [*Chapter 5*]

6. Systematic analysis of Lie algebras in combination with the coset construction for non-linear realisations provides an efficient route to classifications of theories in many different contexts, ranging from inflation to condensed matter physics. [*Chapters 5 & 6*]