

Unraveling the Particle World and the Cosmos at Berkeley—Workshop in Honor of Lawrence Hall and Hitoshi Murayama



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The Geometric Universal One-Loop Effective Action

The field space geometry of two-derivative scalar effective field theories presents a universal structure and introduces geometric covariance through non-derivative field redefinitions. This geometric covariance enables the calculation of the effective action in a covariant manner. In this paper, we extend the geometric covariance to the EFT functional matching problem. While the entire covariance is broken during the matching calculation, we develop a geometric covariant derivative expansion method to evaluate the effective Lagrangian while preserving subcovariance. A universal result is obtained using the geometrized method, which is subsequently applied to the sigma models and singlet extended Standard Model. The results obtained are consistent with conventional matching calculations, and the geometrized method provides a novel perspective on the EFT matching problem.

Title

Abstract

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