

Virtual TEP Seminar

UCLA

Tuesday, April 13th @ 4:00PM

Via Zoom

“The RG Improved Effective Potential from EFT”

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Abstract: The effective potential is a powerful tool for gaining insight into the phenomenon of spontaneous symmetry breaking. It has a well-known loop expansion, which it is necessary to resum via the renormalization group when logs of mass ratios are large. In this talk, we show how to use effective field theory methods to compute the renormalization group (RG) improvement of the effective potential in theories with a large mass hierarchy, for which standard methods break down. Focusing on a model with two real scalars, we show how to compute the effective potential in a systematic expansion in powers of the large mass ratio, as well as to sum large logarithms of mass ratios using RG evolution. As we explain, there are several subtleties which require deviation from the standard effective field theory construction -- for example, the effective potential is the sum of one particle irreducible diagrams, but information about which diagrams are 1PI is lost after matching to the effective field theory. We compare our leading-log result for the one-loop RG improved potential to explicit two-loop calculations, and find agreement.