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## Renormalization of Asymptotic Grand Unified Theories

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The idea of introducing extra spacetime dimensions has long been viewed as a promising way to extend the Standard Model, offering new tools to address some of its limitations. One interesting example is provided by asymptotic Grand Unified Theories (aGUTs), where the gauge couplings of the Standard Model forces do not unify at a single high-energy scale but instead evolve toward a common fixed point in the ultraviolet (UV) regime. Although higher-dimensional theories are found to be non renormalizable and usually considered as effective field theories, they can still be considered fundamental within the framework of asymptotic safety. In my work, I study five-dimensional gauge theories to explore the existence of such fixed points, which would ensure their consistency at very high energies. I also investigate the appearance of both bulk and localized divergences on the boundaries of the 5th dimension, in order to better understand how renormalization operates in these higher-dimensional settings.

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