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The gradient flow extended to the Standard Model

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The gradient flow (GF) has proven to be an effective tool in lattice QCD, with applications such as the extraction of thermodynamic quantities from the flowed energy-momentum tensor and the non-perturbative calculation of the QCD beta function. Additionally, it shows promise for determining operator renormalization matrices in effective field theories. However, its application has been largely confined to pure QCD, limiting its utility in broader contexts, such as Standard Model Effective Field Theory (SMEFT). In this talk, I will present a gradient flow formulation for the minimal flavor-violating Standard Model in the unbroken phase as a first step towards the systematic GF based calculation of SMEFT operator renormalization. I will highlight key results such as the flowed wave function renormalizations through next-to-next-to leading order.

Authors: BORGULAT, Janosch (RWTH Aachen University); HARLANDER, Robert (RWTH Aachen University); Mr KOHNEN, Jonas (RWTH Aachen University)

Presenter: BORGULAT, Janosch (RWTH Aachen University)

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