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Gradient Properties of RG Flows

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General properties of the renormalisation group (RG) are of immense theoretical interest, as they have implications for the evolution of physical systems from high to low energies. In a perturbative setting, RG flows are determined by a vector field, the beta function, that can be computed in a loop expansion. In this talk, we will discuss the gradient property of the RG up to six loops in multi-scalar models in $d=4$ and $d=4-\epsilon$ dimensions. After elucidating a variety of subtleties, we will derive and discuss highly nontrivial constraints that need to be satisfied for the RG flow to be gradient.

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