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Determination of the continuous beta function of SU(3) Yang-Mills theory

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The interpretation of gradient flow as a Wilsonian renormalization group (RG) transformation allows one to determine the continuous RG beta function. This approach is alternative to the finite-volume step-scaling function. Unlike step-scaling methods, where the lattice volume must provide the only scale, the continuous beta function can be used even in the confining regime. We demonstrate this technique in SU(3) Yang-Mills theory and explore the determination of the Λ-parameter. Our investigation is based on simulations done with the tree-level Symanzik action on volumes up to 48^4 and bare gauge couplings between 4.5 and 8.5.

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