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Lattice study of RG fixed point based on gradient flow in 3D $O(N)$ sigma model

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We present the lattice simulation of the renormalization group flow in the 3-dimensional $O(N)$ linear sigma model. This model possesses a nontrivial infrared fixed point, called Wilson-Fisher fixed point. Arguing that the parameter space of running coupling constants can be spanned by expectation values of operators evolved by the gradient flow, we exemplify a scaling behavior analysis based on the gradient flow in the large N approximation at criticality. Then, we work out the numerical simulation of the theory with finite N . Depicting the renormalization group flow along the gradient flow, we confirm the existence of the Wilson-Fisher fixed point non-perturbatively.

Primary author: Dr MORIKAWA, Okuto (RIKEN)

Co-authors: Mr TANAKA, Mizuki (Osaka University); KITAZAWA, Masakiyo (Yukawa Institute for Theoretical Physics); SUZUKI, Hiroshi (Kyushu University)

Presenter: Dr MORIKAWA, Okuto (RIKEN)

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