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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.

Presenter: Dr MORIKAWA, Okuto (Osaka University)

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