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## The lower critical dimension of $\phi^4$ theory from Functional RG

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The lower critical dimension  $d_l$  is the spatial dimension on which fluctuations destroy the phase transition. In the scalar  $\phi^4$  theory, this happens due to the proliferation of kinks. This differs for example from the  $O(N)$  case where it is a result of Goldstone modes and where  $d_l = 2$  is well understood in the RG formalism. We explore whether the Functional Renormalization Group methods can be used to capture those localized excitations and investigate the phase transition just above the lower critical dimension. We have studied the fixed point solutions and discovered that the effective potential develops a boundary layer near its minimum as one approaches the  $d_l$  limit, a feature that was not identified in previous works. We explain how the boundary layer determines the critical behavior in the vicinity of the lower critical dimension.

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