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Phase Transitions for ϕ^4_3

We establish a surface order large deviation estimate for the magnetisation of the low temperature ϕ^4 theory in 3D. As a byproduct, we obtain a decay of spectral gap for the Glauber dynamic given by the ϕ^4_3 singular stochastic PDE. Our main technical contributions are contour bounds for ϕ^4_3, which extends 2D results by Glimm, Jaffe, and Spencer. We adapt an argument by Bodineau, Velenik, and Ioffe to use these contour bounds to study phase segregation. The main challenge to obtain the contour bounds is to handle the ultraviolet divergences of ϕ^4_3 whilst preserving the structure of the low temperature potential. To do this, we build on the variational approach to ultraviolet stability for ϕ^4_3 developed recently by Barashkov and Gubinelli.

This is joint work with A. Chandra and T. S. Gunaratnam.
