Gradient models with non-convex potential

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For *gradient models* with a smooth *strictly convex* potential, it is known, due to Funaki and Spohn, that to each slope there corresponds a unique (tempered) ergodic infinite-volume Gibbs measure.

I will report some initial results for the case of a *non-convex* potential. On the one hand, in our joint work with M. Biskup we describe a mechanism leading to a *non-unicity*, at a particular temperature, of Gibbs measures with vanishing slope.

On the other hand, one still expects unicity for sufficiently small temperatures and sufficiently small slopes. I will outline the results of our joint work with S. Adams and S. Müller, showing the first step in this direction: strict convexity of the surface tension. Our result is based on renormalization group approach introduced by D. Brydges and his collaborators.