Gradient Gibbs measures with disorder

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Abstract. We consider two versions of random gradient models. In model A) the interface feels a bulk term of random fields while in model B) the disorder enters though the potential acting on the gradients. It is well known that for gradient models without disorder there are no Gibbs measures in infinite volume in dimension $d = 2$, while there are gradient Gibbs measures describing an infinite-volume distribution for the gradients of the field, as was shown by Funaki and Spohn. Van Enter and Külske proved that adding a disorder term as in model A) prohibits the existence of such gradient Gibbs measures for general interaction potentials in $d = 2$.

In this talk we discuss under various assumptions of the potentials the questions of existence and uniqueness of shift-covariant gradient Gibbs measures with a given tilt $u \in \mathbb{R}^d$ for model A) when $d \geq 3$ and the disorder has mean zero, and for model B) when $d \geq 1$.