

## **abstract**

ANALYSIS/MATHEMATICAL PHYSICS SEMINAR

Topic:

Speaker:

Affiliation:

Date:

Time/Room:

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I will discuss the problem of determining the number of infinite-volume ground states in the Edwards-Anderson (nearest neighbor) spin glass model on  $\mathbb{Z}^D$  for  $D \geq 2$ . There are no complete results for this problem even in  $D=2$ . I will focus on this case and explain recent results which go some way toward proving that (with zero external field, so that ground states come in pairs, related by a global spin flip) there is only a single ground state pair (GSP).

Our solution applies not to the full plane  $\mathbb{Z}^2$ , but to a half-plane. In addition, rather than showing that a.s. (with respect to the quenched random coupling realization  $J$ ) there is a single GSP, we show that there is a natural joint distribution on  $J$  and GSP's such that for a.e.  $J$ , the conditional distribution on GSP's given  $J$  is supported on only a single GSP.

The methods used are a combination of percolation-like geometric arguments with translation invariance (in one of the two coordinate directions of the half-plane) and uses as a main tool the "excitation metastate" which is a probability measure on GSP's and on how they change as one or more individual couplings vary.

(Joint work with Louis-Pierre Arguin, Chuck Newman, and Dan Stein.)