Holroyd, Alexander E.; **Liggett, Thomas M.**

How to find an extra head: Optimal random shifts of Bernoulli and Poisson random fields.

(English) Zbl 1019.60048
Ann. Probab. 29, No. 4, 1405-1425 (2001).

From the authors' summary: We consider the following problem: given an i.i.d. family of Bernoulli random variables indexed by Z^d, find a random occupied site $X \in Z^d$ such that relative to X, the other random variables are still i.i.d. Bernoulli. Results of Thorisson imply that such an X exists for all d. Liggett proved that for $d = 1$, there exists an X with tails $P(|X| \geq t)$ of order $ct^{-1/2}$, but none with finite $1/2$th moment. We prove that for general d there exists a solution with tails of order $ct^{-d/2}$, while for $d = 2$ there is none with finite first moment. We also prove analogous results for a continuum version of the same problem. Finally we prove a result which strongly suggests that the tail behavior mentioned above is the best possible for all d.

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MSC:

60G60 Random fields
60G55 Point processes (e.g., Poisson, Cox, Hawkes processes)
60K35 Interacting random processes; statistical mechanics type models; percolation theory

Keywords:

random shift; product measure; Poisson process; shift coupling