High-dimensional graphical networks of self-avoiding walks

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Abstract: We use the lace expansion to analyse networks of mutually-avoiding self-avoiding walks, having the topology of a graph. The networks are defined in terms of spread-out self-avoiding walks that are permitted to take large steps. We study the asymptotic behaviour of networks in the limit of widely separated network branch points, and prove Gaussian behaviour for sufficiently spread-out networks on \( \mathbb{Z}^d \) in dimensions \( d > 4 \).

Keywords: self-avoiding walk, lace expansion, Gaussian behaviour.
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