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Physical properties of two-dimensional directed polymer systems obtained via bosonization and related techniques[1] DAVID ZEB ROCKLIN, PAUL M. GOLDBART, University of Illinois at Urbana-Champaign — Classical directed polymers in 2 dimensions are well known to be equivalent to quantum particles in 1+1 dimensions, with polymer configurations corresponding to particle worldlines. This equivalence motivates the use of techniques designed for one-dimensional quantum systems for exploring many-polymer systems, as first exploited by de Gennes [1]. We discuss how thermodynamic quantities and certain correlation functions of a particular model polymer system can be calculated exactly from the Bethe ansatz solution for the Lieb-Liniger model of bosons with repulsive local interactions. We also discuss how the universal properties of more general polymer systems can be captured via Haldane's harmonic-fluid approach. Via this approach, we address various properties of strongly interacting many-polymer systems, focusing on aspects that display qualitative differences from those displayed by single polymers.

[1] P.-G. de Gennes, J. Chem Phys. 48, 2257-2259 (1968)

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