Bosonization on a lattice in 2+1D

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Duality between bosonic and fermionic systems in two spacetime dimensions is well-understood, but analogous dualities in higher dimensions remain mysterious despite a large body of work on the subject, including the recent array of remarkable results concerning bosonization in Chern-Simons-matter theories in three dimensions. In this talk I will show how 2D bosonization can be extended to 3D, with bilinears of fermions on arbitrary lattices being mapped to gauge-invariant observables in a new class of lattice gauge theories. The essential new ingredient is a modified gauge constraint which implements a lattice version of flux attachment, and a notion of discrete spin structure will be seen to emerge.

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