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Majorana-decorated domain wall construction of fermionic SPTs

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— A decorated domain wall construction generates a symmetry-protected topological phase (SPT) by begin in a symmetry-broken phase with multiple domains, binding a non-trivial lower dimensional phase to the domain boundary, and then restoring the symmetry by proliferating the domain walls. In this talk, I will sketch how this technique was used to build a commuting projector model of a unitary Z_2 protected fermionic SPT¹. The symmetry fluxes in this phase, which can be thought of as open ends of domain walls, support Majorana zero modes, and so the domain walls should support a 1D phase which supports Majoranas on open boundaries, the Kitaev chain. Curiously, implementing this consistently requires the introduction of a Kasteleyn orientation, a lattice equivalent of a spin structure, to avoid accidentally breaking fermion parity. Time permitting, I will discuss known and possible generalizations of this construction.

¹NT and L. Fidkowski, "Discrete spin structures and commuting projector models for two-dimensional fermionic symmetry-protected topological phases", Phys. Rev. B 94, 115115 (2016)

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