Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Strongly Interacting Phases of Metallic Wires in Strong Magnetic Field DANIEL BULMASH, Stanford University, CHAO-MING JIAN, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, XIAO-LIANG QI, Stanford University — We elucidate the phase diagram of an interacting, thick metallic wire in a strong magnetic field directed along its length. By considering a suitable change in spatial geometry, we map the problem in the zeroth Landau level with Landau level degeneracy N to one-dimensional fermions with an N-component pseudospin degree of freedom and $SU(2)$-symmetric interactions. This mapping allows us to establish the phase diagram as a function of the interactions for small N (and make conjectures for large N) using renormalization group and non-Abelian bosonization techniques. We find pseudospin-charge separation with a gapless $U(1)$ charge sector and several possible strong-coupling phases in the pseudospin sector. For odd N, we find a fluctuating pseudospin-singlet charge density wave phase and a fluctuating pseudospin-singlet superconducting phase which are topologically distinct. For even $N > 2$, the same phases exist, although they are not topologically distinct, and an additional pseudospin-gapless phase appears. We also make conjectures about topological obstructions to certain ways of gapping out certain Wess-Zumino-Witten models.

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Date submitted: 11 Nov 2016 Electronic form version 1.4