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Non-Fermi liquid phase in metallic Skyrmion crystals[1] HARUKI WATANABE, UC Berkeley, SIDDHARTH PARAMESWARAN, UC Berkeley, UC Irvine, SRINIVAS RAGHU, Stanford, SLAC, ASHVIN VISHWANATH, UC Berkeley, LBNL — Motivated by reports of a non-Fermi liquid state in MnSi, we examine the effect of coupling phonons of an incommensurate skyrmion crystal (SkX) to conduction electrons. We find that non-Fermi liquid behavior emerges in both two and three dimensions over the entire phase, due to an anomalous electron-phonon coupling that is linked to the net skyrmion density. A small parameter, the spiral wave vector in lattice units, allows us to exercise analytic control and ignore Landau damping of phonons over a wide energy range. At the lowest energy scales the problem is similar to electrons coupled to a gauge field. The best prospects for realizing these effects is in short period skyrmion lattice systems such as MnGe or epitaxial MnSi films. We also compare our results with the unusual $T^{3/2}$ scaling of temperature dependent resistivity seen in high pressure experiments on MnSi.

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