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Current-Flow-Driven Nonequilibrium Paramagentic-Ferromagnetic Phase Transitions[1] ADITI MITRA, New York University, IGOR ALEINER, ANDREW MILLIS, Columbia University — We study a 2d itinerant electron system near a ferromagnetic-paramagnetic quantum critical point, which has been driven out of equilibrium by current flow through its bulk. The lack of Galilean invariance in physically realistic models implies that there is no co-moving frame of reference where the physics is identical to that in the absence of current. In the vicinity of the equilibrium critical point the main effect of current flow is shown to be an effective temperature, with current induced drift giving subleading corrections. The current can also destabilize a classical order, and may give rise to new kinds of ordered or quasi-ordered phases.

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