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Mathematical Physics

Rotating states in driven clock- and XY-models

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We consider 3D active plane rotators, where the interaction between the spins is of XY-type and where each spin is driven to rotate. For the clock-model, when the spins take $N \gg 1$ possible values, we conjecture that there are two low-temperature regimes. At very low temperatures and for small enough drift the phase diagram is a small perturbation of the equilibrium case. At larger temperatures the massless modes appear and the spins start to rotate synchronously for arbitrary small drift. For the driven XY-model we prove that there is essentially a unique translation-invariant and stationary distribution despite the fact that the dynamics is not ergodic.

Subjects: **Mathematical Physics (math-ph)**; Statistical Mechanics (cond-mat.stat-mech); Probability (math.PR)

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