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Non-Equlibrium Driven Dynamics of Continuous Attractors in Place Cell Networks WEISHUN ZHONG, University of Chicago, HYUN JIN KIM, DAVID SCHWAB, Northwestern University, ARVIND MURUGAN, University of Chicago — Attractors have found much use in neuroscience as a means of information processing and decision making. Examples include associative memory with point and continuous attractors, spatial navigation and planning using place cell networks, dynamic pattern recognition among others. The functional use of such attractors requires the action of spatially and temporally varying external driving signals and yet, most theoretical work on attractors has been in the limit of small or no drive. We take steps towards understanding the non-equilibrium driven dynamics of continuous attractors in place cell networks. We establish an 'equivalence principle' that relates fluctuations under a time-dependent external force to equilibrium fluctuations in a 'co-moving' frame with only static forces, much like in Newtonian physics. Consequently, we analytically derive a network's capacity to encode multiple attractors as a function of the driving signal size and rate of change.

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