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Dissipative time crystal in an atom-cavity system

I will review our recent research on time crystal dynamics in an atom-cavity system. In contrast to discrete time crystals in driven closed systems, where dissipation constitutes an undesired obstacle, I will discuss an ansatz, where tailored dissipation and fluctuations, induced via controlled coupling to a suitable environment, stabilize time crystal dynamics. The central signature in our implementation in a driven open atom-cavity system is a period doubled switching between distinct chequerboard density wave patterns, induced by the interplay between controlled cavity-dissipation, cavity-mediated interactions and external driving. We demonstrate the robustness of this dynamical phase against system parameter changes and temporal perturbations of the driving.