Research (What is it about?)	**Quantum bifurcation and localization in open systems**
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We find (The result)	In open quantum system dissipation can drive a disordered system into a steady state with tunable localization properties. This "***dissipative engineering***" can create not pure but highly mixed state with desired localization properties. Bifurcation in modulated systems is described with a quantum trajectory method.
Abstract	Localization by disorder is a fifty year old phenomenon, which is still posing new puzzles and yielding new surprises. One of them refers to the case when the N-dimensional quantum systems are open, i.e., they interact with their environments. We develop the theory of this systems with the superior number of states (N>1000) without the mean-field approximation but with a numerically exact realization of the quantum trajectory method. The asymptotic states (***quantum attractors***) in that system can be desired to be a tunable localization properties. Some "regular" bifurcation revealed the types of triple equilibrium state, saddle-node, period doubling and the analogue of dynamic chaos transition. In a disorder-free Hamiltonian with a flat band, one can either obtain a dominating localized asymptotic state or populate whole flat and/or dispersive bands, depending on the value of the control parameter. In a disordered Anderson system, the asymptotic state can be localized anywhere in the spectrum of the Hamiltonian. It has demonstrated that the concept of dissipative Floquet maps provides an operational way to identify quantum attractors and estimate the relaxation time towards them.

Representative articles 2016-2017, quartiles	1. *Yusipov I., Laptyeva T, Denisov S., Ivanchenko M.* Localization in open quantum systems. Phys. Rev. Lett. **118**: 070402 (2017).	Q1
	2. *Ivanchenko M.V., Kozinov E.A., Volokitin V.D., Liniov A.V., Meyerov I.B., Denisov S.V.* Classical bifurcation diagrams by quantum means. Annalen der Physik. **529**: 1600402 (2017).	Q1
	3. *Hartmann M., Poletti D., Ivanchenko M., Denisov S., Hanggi P.* Asymptotic Floquet states of open quantum systems: the role of interaction. New Journal of Physics. **19**: 083011 (2017).	Q1
	4. *Vershinina O.S., Yusipov I.I., Denisov S., Ivanchenko M.V., Laptyeva T.V.* Control of a single-particle localization in open quantum systems. EPL. **119**: 56001 (2017).	Q2
	5. *Volokitin V., Liniov A., Meyerov I., Hartmann M., Ivanchenko M., Hanggi P., Denisov S.* Computation of the asymptotic states of modulated open quantum systems with a numerically exact realization of the quantum trajectory method. Phys. Rev E. **96**: 053313 (2017).	Q1,Q2
	Q-index (Qi) of the result	**3.7**

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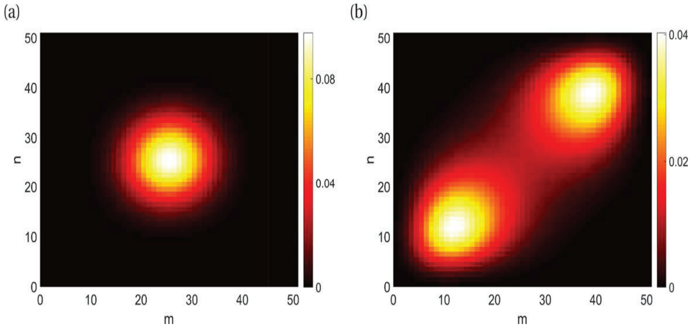
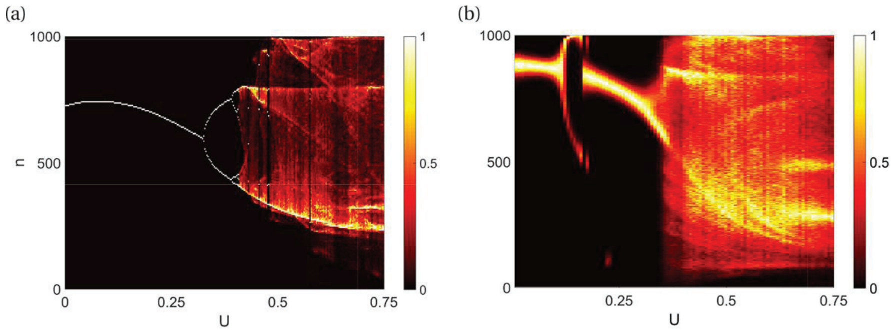
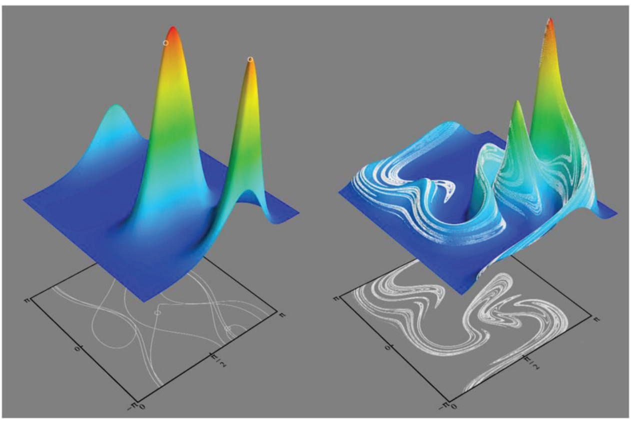


Quantum “pitchfork” type bifurcation: as interaction increases, the distribution of absolute values of the elements of the stationary density matrix evolves from unimodal (a) to bimodal (b).



One-parameter bifurcation diagrams for the (a) classical and (b) quantum periodically modulated systems ($N = 10^3$). In both cases, stroboscopic expectation values of the number of particles in the first site were recorded during 2000 periods (after an equal transient time), and taken to produce color-coded histograms, with the maximal element normalized to one.



3D versions of the Poincaré–Husimi representation of the asymptotic states. Two panels corresponds to interaction strength growth. Bottom planes present the Poincaré sections of the corresponding classical attractors.