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abstract	Understanding properties of quantum matter is an outstanding challenge in science. In this paper, we demonstrate how machine-learning methods can be successfully applied for the classification of various regimes in single-particle and many-body systems. We realize neural network algorithms that perform a classification between regular and chaotic behavior in quantum billiard models with remarkably high accuracy. We use the variational autoencoder for autosupervised classification of regular/chaotic wave functions, as well as demonstrating that variational autoencoders could be used as a tool for detection of anomalous quantum states, such as quantum scars. By taking this method further, we show that machine learning techniques allow us to pin down the transition from integrability to many-body quantum chaos in Heisenberg XXZ spin chains. For both cases, we confirm the existence of universal W shapes that characterize the transition. Our results pave the way for exploring the power of machine learning tools for revealing exotic phenomena in quantum many-body systems.Comment: 12 pages, 12 figure	Understanding the properties of quantum matter is an outstanding challenge in science. In this work, we demonstrate how machine learning methods can be successfully applied for the classification of various regimes in single-particle and many-body systems. We realize neural network algorithms that perform a classification between regular and chaotic behavior in quantum billiard models with remarkably high accuracy. By taking this method further, we show that machine learning techniques allow to pin down the transition from integrability to many-body quantum chaos in Heisenberg XXZ spin chains. Our results pave the way for exploring the power of machine learning tools for revealing exotic phenomena in complex quantum many-body systems.		
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