



Universidad de Valladolid



Ergodicity and the emergence of the hydrodynamic scale in quantum spin chains

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Abstract: How do the laws of large-scale physics emerge from the microscopic dynamics of particles? This is one of the most important questions in theoretical physics, but there are few general and rigorous results, especially in many-body quantum systems. I will discuss our recent results where we establish in quite some generality aspects of emergence in quantum spin lattices (restricting for simplicity to spin chains): the phenomenon of ergodicity, and, most importantly, the emergence of the equations linearised hydrodynamics at the Euler scale. Ergodicity says that upon time averaging over long enough times, one recovers the ensemble description of statistical mechanics. In many-body systems, with infinitely-many degrees of freedom, this notion is more subtle. I will explain how it works, and general results including our “almost everywhere ergodicity”.



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