Bologna Workshop on:
CFT AND INTEGRABLE MODELS
and their applications to Quantum Field Theory, Statistical Mechanics and Condensed Matter Physics

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Universal dynamics of a soliton after a quantum quench

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We propose a new type of experimentally feasible quantum quench protocol. A quantum system is prepared in a coherent, localized excited state of a Hamiltonian, whose interaction strength is characterized by a control parameter. At some point during the evolution of this solitonic excitation, the parameter is suddenly changed. We study the dynamics of solitons after this global quench in a semi-classical, hydrodynamic, limit, for a wide class of systems, and we find it to be universal at short times, i.e. not depending on the microscopics of the physical system.
Numerical support for these results is presented using the Calogero model and the non-linear Schroedinger equation, relevant for the implementation of the proposed protocol with ultracold bosons. Finally, it is shown that the effects of integrability breaking by a parabolic potential and by a power-law non-linearity do not change the universality of the short-time dynamics.

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