Zajednički seminar Fizičkog odsjeka i ZCI QuantiX

Time (s.t.)	Place
Tuesday 22nd November, **14:15** h	room **F-201**

Universal dynamics of a localized excitation after an interaction quench

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We study the time evolution, induced by a quench, of local excitations in one dimension. We focus on interaction quenches: the considered protocol consists in creating a stable localized excitation propagating through the system, and then operating a sudden change of the interaction between the particles. To highlight the effect of the quench, we take the initial excitation to be a soliton. The quench splits the excitation into two packets moving in opposite directions, whose characteristics can be expressed in a universal way. Our treatment, which is hydrodynamic in nature, allows to describe the internal dynamics of these two packets in terms of the different velocities of their components. We confirm our analytical predictions through numerical simulations performed with the Gross-Pitaevskii equation and with the Calogero model (as an example of long range interactions and solvable with a parabolic confinement). Through the Calogero model we also discuss the effect of an external trapping on the protocol. The hydrodynamic approach shows that there is a difference between the bulk velocities of the propagating packets and the velocities of their peaks: it is possible to discriminate the two quantities, as we show through the comparison between numerical simulations and analytical estimates. In the realizations of the discussed quench protocol in a cold atom experiment, these different velocities are accessible through different measurement procedures.

• F. Franchini, A. Gromov, M. Kulkarni and A. Trombettoni, J. Phys. A: Math. Theor. **48** (2015) 28FT01
• F. Franchini, M. Kulkarni and A. Trombettoni, arXiv:1603.03051 (Accepted to NJP)

Voditelji seminara FO
Damir Pajić i Ivica Smolić