Bologna Workshop on:

CFT AND INTEGRABLE MODELS

and their applications from gauge/gravity dualities to statistical mechanics and quantum information

Contribution ID: **95** Type: **10 min Talk + Poster**

Relaxation and Energy Transfer in the (Double) Quantum Sine-Gordon Model

Monday, 4 September 2023 17:00 (10 minutes)

The sine-Gordon model is a well-known integrable field theory which provides an effective description for systems such as Josephson-coupled one-dimensional bosonic quasi-condensates. The model can be interpreted as a quantum pendulum coupled to a phononic bath of interacting oscillators. A key question is the energy transfer dynamics between these modes when the system is out of equilibrium and how the breakdown of integrability affects this process. In this study, we investigate these questions by simulating the full quantum dynamics following quantum quenches, specifically focusing on energy transfer between the modes and correlations of the phase field.

To carry out our investigation, we employ a novel truncated conformal space approach (TCSA) complemented by a mini-superspace, enabling full quantum simulations that extend closer to the experimentally accessible parameter range than previous studies. By comparing our results with semi-classical truncated Wigner approximation (TWA) simulations, we gain insights into the validity range of the two methods and identify their differences.

Through this research, we aim to enhance our understanding of relaxation and energy transfer phenomena in the (double) quantum sine-Gordon model, shedding light on the dynamics under non-equilibrium conditions and the implications of integrability breakdown.

Primary author: SZÁSZ-SCHAGRIN, Dávid (Budapest University of Technology and Economics)

Co-authors: TAKACS, Gabor (Department of Theoretical Physics, Budapest Unitersity of Technology and Economics); Dr LOVAS, Izabella (Kavli Institute for Theoretical Physics, University of California)

Presenter: SZÁSZ-SCHAGRIN, Dávid (Budapest University of Technology and Economics)

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