Bologna Workshop on:

CFT AND INTEGRABLE MODELS

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

Contribution ID: **339** Type: **Poster**

Entanglement and quench dynamics in the thermally perturbed tricritical fixed point

Thursday 4 September 2025 13:30 (30 minutes)

The Blume–Capel model, a spin chain system exhibiting a tricritical point described by a conformal field theory with central charge $c = 7/10$, serves as a rich framework for studying its thermal perturbation, the E_7 integrable quantum field theory. In my work, I investigate both numerical and analytical aspects of the E_7 model, aiming to validate theoretical predictions and explore new phenomena relevant for experimental realization. The numerical component of the work utilizes the infinite Time Evolving Block Decimation (iTEBD) algorithm to simulate real-time dynamics, focusing on post-quench evolution. These simulations allowed identification of three out of four predicted even particles through spectral analysis. The analytical part centers on the form factor bootstrap program, through which I compute one- and two-particle form factors of the twist field form factors incorporating nontrivial symmetry structures. These results were validated using the Δ-theorem. Further, I study the post-quench dynamics of the Blume–Capel model near the tricritical point, analyzing expectation values and entanglement entropies following E_7 mass quenches. The time evolution curves of local observables, the Neumann and the Rényi entropies exhibit strong agreement with theoretical predictions, thereby reinforcing the field-theoretical framework.

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Session Classification: Posters