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# Nonanalytic correlation length in the Ising field theory

*Friday 5 September 2025 13:30 (30 minutes)*

I present recent progress in computing finite-temperature dynamical correlation functions in the 1+1 dimensional Ising field theory, an integrable quantum field theory. Leveraging the fact that in the Ising model, the finite-temperature form factor expansion can be recast as a Fredholm determinant, I develop a numerical approach based on evaluating these determinants. This representation is especially powerful in the space-like regime, where only a few terms of the form factor series are sufficient to accurately compute the correlations. In contrast, the time-like regime requires an effective resummation of the entire series. I demonstrate that the Fredholm representation, combined with a suitable analytic continuation strategy, enables access to this regime as well, extending the reach of the method beyond previously tractable cases.

As a key application, I demonstrate that in the paramagnetic phase, the thermal correlation length displays an unexpected nonanalytic dependence on both the temperature and the space-time ray parameter. This effect persists even at the lattice level, as supported by new, yet unpublished results from the finite-temperature dynamics of the Ising spin chain. These findings suggest that the interplay between integrability and thermal dynamics gives rise to richer analytic structures than previously understood.

**Authors:** DOYON, Benjamin (King's College London); DEL VECCHIO DEL VECCHIO, Giuseppe; CSÉPÁNYI, István; KORMOS, Márton (Budapest University of Technology and Economics; HUN-REN-BME-BCE Quantum Technology Research Group)

**Presenter:** CSÉPÁNYI, István

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