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Talk: Towards a mathematical theory of the ODE/IM correspondence

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The ODE/IM correspondence is, in a nutshell, the fact that the solutions to the Bethe equations of some integrable quantum field theory can be exactly represented as spectral determinants of some linear differential operators. This discovery goes back to Dorey and Tateo 1998 paper, and there has been tremendous development since then, which, mathematically speaking, amounts to a formidable series of fascinating and hard conjectures.

In particular, in 2004 Bazhanov, Lukyanov & Zamolodhchikov conjectured that to each state of the Quantum KdV model there corresponds a certain quantum anharmonic oscillator, called a monster potential, such that the spectral determinant of the latter coincides with the eigenvalue of the Q operator of the former. In this talk I provide an outline of the proof –conditional on the existence of a certain Puiseux series –of the BLZ conjecture, that I have recently obtained in collaboration with Riccardo Conti. In
particular, I will present the large-momentum analysis of the monster potentials and of the Destri-De Vega equation for the Quantum KdV model.

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