



Istituto Nazionale di Fisica Nucleare

Bologna Workshop on:

CFT AND INTEGRABLE MODELS

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



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On the origin of the correspondence between classical and quantum integrable theories

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If we start from certain functional relations as definition of a quantum integrable theory, then we can derive from them a linear integral equation. It can be extended, by introducing dynamical variables, to become an equation with the form of Marchenko's. Then, we derive from the latter a classical (differential) Lax pair. We exemplify our method by focusing on the massive version of the ODE/IM (Ordinary Differential Equations/Integrable Models) correspondence from Quantum sine-Gordon (sG) with many moduli/masses to the classical sinh-Gordon (shG) equation, so describing, in a particular case, some super-symmetric gauge theories and the AdS_3 strong coupling scattering amplitudes/Wilson loops. Yet, we present it in a way which reveals its generality of application. In fact, we give some hints on how it works for spin chains.

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