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New integrable deformations of principal chiral sigma models

Integrability is a key property of certain field theories, often characterized by an infinite number of conserved currents. This feature enables the exact computation of solutions and observables. Typically, integrability is found in one- or two-dimensional models, such as 2D integrable sigma models. These models, among a small class of interacting field theories, can be solved exactly both classically and quantum mechanically. A canonical example is the Principal Chiral Model (PCM), a two-dimensional field theory where fields map from a two-dimensional space Σ to a group G. The PCM is integrable because it admits a Lax connection, leading to an infinite set of conserved charges.

Constructing deformations of PCM that preserve integrability allows us to explore different regions of integrable models. A notable deformation is the Yang-Baxter (YB) deformation, particularly the η-deformation—an inhomogeneous YB deformation of the PCM.

In this poster, I will outline the key features of η-deformations, including their integrability structure and applications. Moreover, I also discuss the eta-deformations of the PCM in the presence of spectators, which are eta-deformations when only a subgroup H of G is deformed, rather than the entire group G. In this context, the fields taking values in the coset space G/H will not be affected by the deformation, playing the role of spectators. However, the dynamics of these spectator fields mix with those of fields involved in the deformation, resulting in a non-trivial, new integrable deformation of the PCM.

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