Integrability in Condensed Matter Physics and Quantum Field Theory



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Talk: Generalized Fishnet CFTs

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I will describe a broad class of d-dimensional conformal field theories of SU(N) adjoin scalar fields generalizing the 4d Fishnet CFT (FCFT) discovered by O. Gurdogan and myself, as a special limit of γ -deformed N = 4 SYM theory. In the planar limit the perturbation theory of FCFTs is dominated by the generalized "fishnet" planar Feynman graphs. These graphs are explicitly integrable, as was shown long ago by A. Zamolodchikov. The Zamolodchikov's construction is based on the dual Baxter lattice (straight lines on the plane intersecting at arbitrary slopes) and the star-triangle identities. It can serve as a "loom" for "weaving" the Feynman graphs of these FCFTs, with certain types of propagators, at any d. The Baxter lattice with M different slopes and any number of lines parallel to those, generates an FCFT consisting of M(M - 1) fields and a certain number of chiral vertices of different valences with distinguished couplings. These nonunitary, logarithmic CFTs enjoy certain reality properties for their spectrum due to a symmetry similar to the PT-invariance of non-hermitian hamiltonians proposed by C. Bender and S. Boettcher. The talk is based on my recent work with E.Olivucci.

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