Contribution ID: **94**   Type: **not specified**

New developments in N=2 supersymmetric gauge theories: integrability, black holes

Monday 26 September 2022 17:40 (20 minutes)

In this talk I'll explain how new physical results in 4D (N=2) supersymmetric matter gauge theories can be found by connecting them to 2D quantum integrable models. In particular, we set up an identification between the basic mathematical and physical objects of the two kind of theories (the Q, Y and T functions of integrability and the periods and masses of the gauge theories) and from this a flow of concepts and mathematical identities between them is derived. Also, we use such new correspondence to prove another very recently found correspondence between precisely the same kind of gauge theories and black holes perturbation theory. From this several new insights into black holes theory follow, especially a new powerful way of computing quasinormal modes frequencies (the Thermodynamic Bethe Ansatz nonlinear integral equation), characterising the gravitational wave signal (in the ringdown phase of black hole merging). We do this in all details for SU(2) gauge theories with Nf=0,1,2 flavours.

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Session Classification: Low x, PDFs and hadronic final states

Track Classification: Recent theoretical results on QCD and saturation