SUPERSYMMETRIC GAUGE THEORIES AND THE QUANTISATION OF INTEGRABLE SYSTEMS

Samson Shatashvili
Trinity college, Dublin
samson@maths.tcd.ie

I review the recent developments about the relation between supersymmetric vacua and quantum integrability. From the quantum integrability side this relation includes various spin chains, as well as many well-known quantum many body systems like elliptic Calogero-Moser system and generalisations. From the gauge theory side one has the supersymmetric gauge theory with four (and eight) supercharges in the space-time background which is a product of a d-dimensional torus, or a two dimensional cigar with Omega-deformation, and a flat space (with the total dimension of space-time being 2, 3, 4 or 5). The gauge theory perspective provides the exact energy spectrum of the corresponding quantum integrable system. Key notions, usually appearing in the topic of quantum integrability, such as Baxter equation, Yang-Yang function, Bethe equation, spectral curve, Yangian, quantum affine algebra, quantum elliptic algebra, q-characters - all acquire meaning in these gauge theories.