Contribution ID: **3** Type: **not specified**

Exact results in N=2 Super Yang-Mills Theories with defects

Monday, 11 September 2017 17:15 (45 minutes)

We study the non-perturbative behaviour of superconformal gauge theories with rigid N=2 supersymmetry in four dimensions, in particular N=2* theories, in presence of two-dimensional defects and discuss the relation between their S-duality properties and the possibility of computing exact quantum observables. For these theories, the prepotential and the twisted chiral superpotential, that encode respectively the four and two-dimensional low-energy effective dynamics on the Coulomb branch of moduli space, obey a modular anomaly equation whose validity is related to S-duality. This fact allow one to write them in terms of (quasi)-modular forms, thus resumming all instanton contributions. The results can be checked against the microscopic multi-instanton calculus and the chiral ring equations of the quiver theories associated to the coupled 2d/4d systems.

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