

Planar Equivalence

Adi Armoni

Swansea University

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Happy birthday, Gabriele!

During 2003-2014, together with Misha Shifman and Graham Shore, we collaborated on planar equivalence.

We exploited the large- N relation between a non-supersymmetric version of QCD and super Yang-Mills to estimate non-perturbative quantities in QCD.



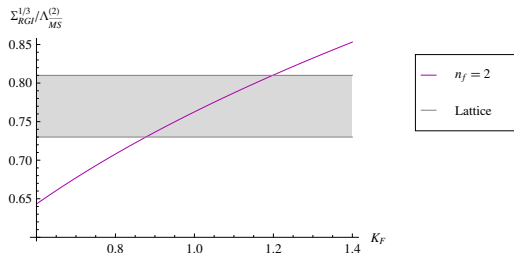
It was very stimulating and fruitful.

What is non-perturbative planar equivalence?

Together with Gabriele we argued that:

At large- N and in a certain well defined sector, $SU(N)$ YM theory with a Dirac fermion in the two index antisymmetric representation is equivalent to $\mathcal{N} = 1$ SYM!

Using planar equivalence and the knowledge of the gluino condensate in $\mathcal{N} = 1$ SYM we were able to calculate the quark condensate in real QCD



Selected references

- ▶ Exact results in non-supersymmetric large N orientifold field theories, *A. Armoni, M. Shifman, G. Veneziano*, Nucl.Phys.B 667 (2003) 170-182.
- ▶ SUSY relics in one flavor QCD from a new $1/N$ expansion, *A. Armoni, M. Shifman, G. Veneziano*, Phys.Rev.Lett. 91 (2003) 191601.
- ▶ QCD quark condensate from SUSY and the orientifold large N expansion, *A. Armoni, M. Shifman, G. Veneziano*, Phys.Lett.B 579 (2004) 384-390.
- ▶ Quark condensate in massless QCD from planar equivalence, *A. Armoni, G. Shore, G. Veneziano*, Nucl.Phys.B 740 (2006) 23-35.
- ▶ The quark condensate in multi-flavour QCD planar equivalence confronting lattice simulations, *A. Armoni, M. Shifman, G. Shore, G. Veneziano*, Phys.Lett.B 741 (2015) 184-189.