SUSY Gauge Singlets and Dualities
Moriond EW09

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**Why bother?**

- *Seiberg duality* gives us a different way of looking at supersymmetric gauge theories.\(^1\)
- We believe it will help in understanding many aspects of BSM physics such as gauge unification, proton decay and dynamical SUSY breaking.
- Problem: currently, dualities only exist for theories with highly constrained matter content and unrealistic superpotentials.
- Our goal is to find a dual theory to a more realistic GUT, like the supersymmetric SU(5) Georgi-Glashow model.

\(^1\)N. Seiberg - arXiv:hep-th/9411149
In models of SUSY breaking with *direct mediation*, the messengers deflect the gauge coupling unification.

Extrapolating to higher scales it may appear as though unification occurs at a negative, unphysical value of the coupling constant $\frac{1}{\alpha}$.

In the dual theory the unification is much more natural.\(^2\)

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\(^2\)S. Abel, V.V. Khoze - arXiv:809.5262v1[hep-ph]
By adding gauge singlets to certain theories we have been able to alleviate some of the constraints on the superpotential required for duality.\textsuperscript{3}

Our approach retains access to the powerful, quantum mechanical tests of Seiberg duality.

The theories we have considered contain several of the standard ingredients of GUTs (e.g. multiple generations of adjoints/antisymmetrics).

\textsuperscript{3}S. Abel, J. Barnard - arXiv:0903.1313v1 [hep-th]