TOPOLOGICAL REDUCTION OF 4D SYM TO 2D SIGMA MODELS

M. Bershadsky, A. A. Johansen, V. Sadov, C. Vafa

By considering a (partial) topological twisting of supersymmetric Yang-Mills compactified on a $2d$ space with 't Hooft magnetic flux turned on we obtain a supersymmetric σ-model in 2 dimensions. For $N = 2$ SYM this maps Donaldson observables on products of two Riemann surfaces to quantum cohomology ring of moduli space of flat connections on a Riemann surface. For $N = 4$ SYM it maps S-duality to T-duality for σ-models on moduli space of solutions to Hitchin equations. This analysis turns out to be important for better understanding of electro-magnetic duality in four dimensions.

REFERENCE

Bershadsky M., Johansen A.A., Sadov V., Vafa C. //Nuclear Physics. 1995. **B448**. 166–186.

A CRITICAL BEHAVIOUR OF ANOMALOUS CURRENTS, ELECTRO-MAGNETIC UNIVERSALITY AND CFT

D. Anselmi, M. Grisaru, A. A. Johansen

We discuss several aspects of conformal field theories in four dimensions (CFT_4), in the context of electric-magnetic duality. We analyse the behaviour of anomalous currents under RG flow to a conformal fixed point in $N = 1$, $D = 4$ supersymmetric gauge theories and we extend the duality map to non-chiral operators. We compute the anomalous dimension of the Konishi current and find that it is related to the slope of the beta function at the critical point. This fact can be combined with electro-magnetic duality to establish a universality of the subleading behaviour of the non-critical theory near the critical point. As a byproduct we compute the slope of the beta function in the strong coupling regime. We study some basic features of CFT_4. We note that the OPE of $T_{\mu\nu}$ with itself does not close, but mixes with a special additional operator Σ which in the free supersymmetric case is the Konishi current. We also observe that there are *two* central charges; they allow us to count both the vector and matter effective degrees of freedom. We discuss implications in generic interacting CFT_4's, in particular the fact that CFT_4 seems to be naturally equipped with a privileged off-critical deformation Σ.

REFERENCE

Anselmi D., Grisaru M., Johansen A.A. Preprint HUTP-95/A048. Submitted for publication in Nucl.Phys., **B**.