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Remarks on BPS Wilson loops in non-conformal $\mathcal{N}=2$ gauge theories and localization

Thursday, 7 September 2023 12:00 (20 minutes)

We consider $1/2$ BPS supersymmetric circular Wilson loops in $\mathcal{N} = 2$ $SU(N)$ SYM theories with massless matter content and non-vanishing β -function. In flat space we compute the observable via perturbative techniques, employing dimensional reduction to regularize the ultraviolet divergences and performing standard renormalization. We extend the analysis on the sphere \mathbb{S}^4 using both Feynman diagrams and the matrix model resulting from the localization procedure. On the matrix model side, working with a non-vanishing β -function requires a consistent regularization scheme to obtain a well-defined partition function. We show that at order g^4 a suitable procedure gives perfect agreement between localization predictions and standard perturbative renormalization. The results on \mathbb{S}^4 and those in flat space coincide for the Wilson loop at order g^4 even if conformal symmetry is broken at the quantum level, but we expect a mismatch at order g^6 due to an anomalous contribution which is generated by the renormalization procedure on the sphere and does not appear in \mathbb{R}^4 .

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