

In this article, the dual conformal symmetry of one-loop *planar* amplitudes in $\mathcal{N} = 4$ super Yang-Mills theory is studied. This symmetry is exact at tree level but is anomalous at loop level. In [1], it is proposed that the dual conformal anomaly can be controlled by the tree-level maximally-helicity-violating (MHV) amplitudes. To be concrete, by use of a duality between the Wilson loops and the MHV amplitudes in planar $\mathcal{N} = 4$ super Yang-Mills theory, it is conjectured that loop amplitudes of the theory generically factorizes into two parts; one is the tree-level MHV amplitude and the other is a dual conformal invariant factor. In other words, the anomaly is encoded in the MHV amplitudes. In this article, the anomalous part is further investigated by use of box functions that arise in the one-loop calculations. A systematic calculatory technique is developed in the article. As a byproduct, the authors show that the above-mentioned factorization of generic amplitudes holds for next-to-MHV (NMHV) amplitudes. In the next article by the same authors [2] (MR2607444), this factorization rule is in fact proved for any one-loop amplitudes in general.

References

- [1] J. M. Drummond, J. Henn, G. P. Korchemsky and E. Sokatchev, Nucl. Phys. B **828**, 317 (2010) [arXiv:0807.1095 [hep-th]].
- [2] A. Brandhuber, P. Heslop and G. Travaglini, JHEP **0910**, 063 (2009) [arXiv:0906.3552 [hep-th]].