In this article, correspondence between an S-matrix of planar $\mathcal{N} = 4$ super Yang-Mills theory and a correlation function of a supersymmetric Wilson loop in twistor space is proposed for an arbitrary number of gauge bosons. The correspondence is previously known for the planar maximally helicity violating (MHV) amplitudes to all loop orders. In this article, it is first proposed with reasonable examples that the correspondence can be extended to general helicity configurations. (Note that a similar result, but with a different approach, was also obtained in [1] right after this article.) The examples are given by the NMHV and N^2MHV tree amplitudes, the MHV and N^2MHV one-loop amplitudes, and the N^2MHV two-loop amplitudes; for loop amplitudes the correspondence is shown at the level of integrand. Interested readers should also refer to a more recent paper [2] in which a proof of this correspondence is provided.

References

[1] S. Caron-Huot, JHEP **1107**, 058 (2011) [arXiv:1010.1167 [hep-th]].

[2] T. Adamo, M. Bullimore, L. Mason and D. Skinner, JHEP **1108**, 076 (2011) [arXiv:1103.4119 [hep-th]].