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Cluster Algebraic letters 5- and 6-point QCD processes

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By breaking dual conformal invariance, we transform cluster-algebraic predictions for the alphabet of 9-point amplitudes in $N = 4$ super Yang-Mills theory to analogous predictions for 5- and 6-point processes in QCD. We start by obtaining, for the first time, candidate letters for 6-point processes with one massive external leg, and confirm that they essentially contain those of all 1-loop integrals with these kinematics. Taking the limit where the massive leg becomes massless, we then reproduce the 167 letters recently argued to suffice for the finite part of planar 2-loop amplitudes for 6-point massless QCD processes, and further predict another 14 letters that might appear at higher loops. Similarly, we analyse the 5-point 2-mass case, where we manage to match with almost all known letters known by direct Feynman Integral computations. Finally, we comment on positivity properties of these letters.

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