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On BCFW shifts of integrands and integrals

n this talk a first step is made towards the extension of Britto-Cachazo-Feng-Witten (BCFW) tree level on-shell recursion relations to integrands and integrals of scattering amplitudes to arbitrary loop order. Surprisingly, it is shown that the large BCFW shift limit of the integrands has the same structure as the corresponding tree level amplitude in any minimally coupled Yang-Mills theory in four or more dimensions. This implies that these integrands can be reconstructed from a subset of their 'single cuts'. The relation between shifts of integrands and shifts of its integrals is investigated explicitly at one loop. Two particular sources of discrepancy between the integral and integrand are identified related to UV and IR divergences. This is cross-checked with known results for helicity equal amplitudes at one loop. The nature of the on-shell residue at each of the single-cut singularities of the integrand is commented upon. Several natural conjectures and opportunities for further research present themselves.

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