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## Momentum shift and on-shell constructible massive amplitudes

Thursday 16 May 2024 16:45 (15 minutes)

We construct tree-level amplitude for massive particles using on-shell recursion relations based on two classes of momentum shifts: an all-line transverse shift that deforms momentum by its transverse polarization vector, and a massive BCFW-type shift. We illustrate that these shifts allow us to correctly calculate four-point and five-point amplitudes in massive QED, without an ambiguity associated with the contact terms that may arise from a simple "gluing" of lower-point on-shell amplitudes. We discuss various aspects and applicability of the two shifts, including the large-z behavior and complexity scaling. We show that there exists a ''good" all-line transverse shift for all possible little group configurations of the external particles, which can be extended to a broader class of theories with massive particles such as massive QCD and theories with massive spin-1 particles. The massive BCFW-type shift enjoys more simplicity, but a ''good" shift does not exist for all the spin states due to the specific choice of spin axis.

## Mini Symposia (Invited Talks Only)

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