Particle Physics on the Plains 2024



Contribution ID: 15

Type: not specified

Momentum shift and on-shell recursion relation for electroweak theory

Saturday 2 November 2024 16:30 (18 minutes)

We study the All-Line Transverse (ALT) shift which we developed for on-shell recursion of amplitudes for particles of any mass. We discuss the validity of the shift for general theories of spin \leq 1, and illustrate the connection between Ward identity and constructibility for massive spin-1 amplitude under the ALT shift. We apply the shift to the electroweak theory, and various four-point scattering amplitudes among electroweak gauge bosons and fermions are constructed. We show explicitly that the four-point gauge boson contact terms in massive electroweak theory automatically arise after recursive construction, independent of UV completion, and they automatically cancel the terms growing as (energy)⁴ at high energy. We explore UV completion of the electroweak theory that cancels the remaining (energy)² terms and impose unitarity requirements to constrain additional couplings. The ALT shift framework allows consistent treatment in dealing with contact term ambiguities for renormalizable massive and massless theories, which we show can be useful in studying real-world amplitudes with massive spinors.

Authors: MAHBUB, Ishmam (University of Minnesota Twin Cities); LYU, Kunfeng (University of Minnesota); GAO, Ting (University of Minnesota); KE, Wenqi (University of Minnesota); EMA, Yohei; LIU, Zhen

Presenter: MAHBUB, Ishmam (University of Minnesota Twin Cities)

Session Classification: Beyond the Standard Model Phenomenology 1