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Taming IBPs with Transverse Integration

Thursday, 12 September 2024 12:15 (25 minutes)

Reduction of Feynman integrals to a basis of linearly independent master integrals is a crucial step in any perturbative calculation, but also one of its main bottlenecks. In this talk I will present an improvement over the traditional approach to IBP reduction, that exploits transverse integration identities. Given an integral family to be reduced, the key idea is to find sectors whose corner integrals correspond to either diagrams with fewer external legs or diagrams that can be factorized as products of lower-loop integrals. Then, using transverse integration identities, i.e. a tensor decomposition in the subspace that is transverse to the external momenta of the diagrams, we map integrals belonging to these sectors and their subsectors to (products of) integrals belonging to new and simpler integral families, characterized by either fewer generalized denominators, fewer external invariants, lower loops or combinations thereof. Integral reduction is thus drastically simpler for the newer families. I will include some applications to cutting-edge two-loop families which show significant improvements with respect to traditional methods.

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