

# Discontinuity method for evaluating scattering amplitudes within the worldline formalism

## Content

The worldline formalism offers an alternative framework to the standard diagrammatic approach in quantum field theory, based on first-quantized relativistic path integrals. Over recent decades, this formalism has attracted growing interest due to its potential applications and computational advantages. As a result, a collection of worldline master integrals has been derived within this approach. However, efficient mathematical tools for evaluating these integrals remain limited.

Motivated by unitarity methods used in the conventional formalism of quantum field theory, this talk proposes a novel framework for evaluating one-loop worldline master integrals, up to a rational function in the kinematical external invariants, through the computation of their discontinuities. Similarly to standard unitarity techniques, the method involves decomposing an  $n$ -point one loop amplitude in  $D = 4$  dimensions into a linear combination of tadpole, bubble, triangle, and box master integrals. The coefficients of this decomposition are rational functions of the external kinematic invariants determined by the discontinuities of the corresponding worldline master integrals.

## Summary

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