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Higher-Loop Scattering Amplitude Computations Beyond Polylogarithms —From Feynman Integrals to Numbers

Tuesday 2 September 2025 11:00 (1 hour)

In my talk, I will discuss strategies to compute scattering amplitudes in particle physics that evaluate to functions beyond polylogarithms. A crucial step in calculating these amplitudes is selecting the appropriate scalar Feynman integrals. It turns out that certain integrals known as canonical master integrals reveal the transcendental structure of the amplitude and are also simpler to calculate.
In the first part of my talk, I will explain a method for identifying these canonical integrals, particularly when the underlying geometry is of elliptic type or even beyond. In the second part, I will then provide several examples where this technique has been applied to compute elliptic scattering amplitudes. In particular, I will discuss strategies for evaluating the appearing elliptic iterated integrals and, therefore, also the final scattering amplitude in an efficient and fast way. Moreover, this process can be enhanced by using Bernoulli-like variables, which accelerate and improve the convergence of the resulting series expansions.

Presenter: NEGA, Christoph