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Feynman integrals in QFT

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In this talk, I will review theoretical and phenomenological aspects of multi-loop amplitudes, focusing on their wide range of physical applications. I will gently introduce the method employed in the calculation of the $gg \rightarrow HH$ NLO SM and Beyond cross section to show where Feynman integrals enter, and where calculation bottleneck may arise.

The increasing mathematical understanding of Feynman integrals brought impact on fields from higher-order perturbative QFT predictions to Cosmology and Classical Gravity.

I will introduce some of the main state-of-the-art methods for evaluating Feynman integrals, and I will show how such objects are connecting a broad spectrum of techniques from differential geometry, differential equations, machine learning and numerical approaches.

In conclusion, I will show some applications of these methods on scattering processes of phenomenological interest, like $q \bar{q} \rightarrow t \bar{t}$ virtual amplitude contribution at NNLO.

Auteur principal: RONCA, JONATHAN

Orateur: RONCA, JONATHAN

Classification de Session: Higgs and EW

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