SEMPARIS – Séminaires en région parisienne

http ://string.lpthe.jussieu.fr/semparis/

Particle Physics at LPTHE

Mardi 10 Décembre 2024, 14 :00
LPTHE, library and zoom link below(https ://cern.zoom.us/j/66414483345 ?pwd=4BtVql7Nw19h
)
Domaines : hep-ph

Titre : *Tame multi-loop multi-leg Feynman integrals*

Orateur : **Yan-Qing Ma (Peking University)**

Résumé : *High-precision test has become the core direction of particle physics research, both now and for the foreseeable future. To achieve this goal, it is essential not only to conduct high-precision measurements experimentally but also to provide accurate theoretical predictions. The main bottleneck in obtaining high-precision theoretical predictions based on perturbative quantum field theory lies in the calculation of multi-loop multi-leg Feynman integrals. Although significant progress has been made in this area in recent years, the existing methods still fail to meet the urgent demands of particle physics experiments, particularly those at high-luminosity LHC. We have conducted long-term research on this issue and recently discovered that multi-loop multi-leg Feynman integrals can be expressed as integrals over a small number of parameters for one-loop-like Feynman integrals, with the number of parameters being 2 for two loops, 5 for three loops, and so on. One-loop-like Feynman integrals, which resemble one-loop Feynman integrals, can be computed in an extremely efficient and systematic manner ; the remaining integrals over a small number of parameters can be processed using established methods developed in the study of Feynman integrals. This novel structure of Feynman integrals is expected to completely overcome the computational bottleneck of multi-loop multi-leg Feynman integrals, thus meeting the phenomenological needs of particle physics.*