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Progress in Automated Next-to-Leading Order calculations

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With the beginning of the experimental programs at the LHC, the need of describing multi particle scattering events with high accuracy becomes more pressing. On the theoretical side, perturbative calculation within leading order precision cannot be sufficient, therefore accounting for effects due to Next-to-Leading Order (NLO) corrections becomes mandatory. In the last few years we observed a tremendous progress in the computation of one-loop virtual corrections for processes involving many particles. The new ideas based on the universal four-dimensional decomposition for the numerator of the integrand for any one-loop scattering amplitudes, the four-dimensional unitarity-cuts, and unitarity-cuts in d-dimension, yielding the complete determination of dimensionally regulated one-loop amplitudes, give the possibility to develop automated multi-process evaluators for scattering amplitudes at NLO.

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