MP 11: Teilchen und ihr Wechselwirkungen

Zeit: Donnerstag 14:00–14:40 Raum: HS 23

MP 11.1 Do 14:00 HS 23

Phase Spaces, Parity Operators, and the Born-Jordan Distribution — Bálint Koczor[1], Frederik vom Ende[1], Maurice de Gosson[2], Steffen J. Glaser[1], and •Robert Zeier[3] — [1]Technische Universität München, Department Chemie, Lichtenbergstrasse 4, 85747 Garching, Germany — [2]Faculty of Mathematics (NuHAG), University of Vienna, Oskar-Morgenstern-Platz 1, 1090 Wien, Austria — [3]Adlzreiterstrasse 23, 80337 München, Germany

Phase spaces as given by the Wigner distribution function provide a natural description of infinite-dimensional quantum systems. They are an important tool in quantum optics and have been widely applied in the context of time-frequency analysis and pseudo-differential operators. Phase-space distribution functions are usually specified via integral transformations or convolutions which can be averted and subsumed by (displaced) parity operators proposed in this work. Building on earlier work by Grossmann for Wigner distribution functions, parity operators are used to define phase-space distribution functions as quantum-mechanical expectation values. These distribution functions are related to the so-called Cohen class and to various quantization schemes. Our approach is also applied to the Born-Jordan distribution which originates from the Born-Jordan quantization. The corresponding parity operator is written as a weighted average of both displacements and squeezing operators and we determine its generalized spectral decomposition. This leads to an efficient computation of the Born-Jordan parity operator and example quantum states reveal unique features of the Born-Jordan distribution. Refer to arxiv:1811.05872.

MP 11.2 Do 14:20 HS 23

Developments in scattering amplitudes for three-jet production at NNLO — •Simone Zoia — Max-Planck Institute for Physics, Munich

The increasing experimental precision at hadron colliders challenges theoretical physicists to keep up with the accuracy of the corresponding theoretical predictions. Many of the perturbative calculations appearing in the latest Les Houches “wish list" involve yet unknown $2 \to 3$ scattering amplitudes.

We review the recent developments in the calculation of the virtual two-loop corrections for five-particle processes. In particular, we present the analytic calculation of all master integrals of the last missing non-planar integral family for five-particle massless scattering at two loops in any 4D gauge theory. We employ the cutting-edge mathematical techniques for calculating multi-loop Feynman integrals: the method of differential equations, the study of leading singularities to put them in the canonical form, and the symbol alphabet that identifies the space of functions.

With the results here presented, together with the ones already given in the literature, we now know the analytic expressions of all master integrals needed e.g. for the virtual two-loop corrections to three-jet production at NNLO.