Advances in computational methods for Quantum Field Theory calculations

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Stellingen

behorende bij het proefschrift
Advances in computational methods
for Quantum Field Theory calculations
door Ben Ruijl

1. Contrary to expectations, a simple Stochastic Hill Climbing performs better for expression simplification than the complex MCTS algorithm (Ch.2).

2. Parametrically solving IBP systems is superior to the commonly used Laporta method, since the growth of the rational coefficients can be controlled better (Ch.3).

3. The applicability of the R^*-operation is greatly enhanced by allowing it to work on Feynman diagrams with arbitrary numerator structure (Ch.5).

4. There is no need to compute the six-loop QCD beta function, since this correction will be too small to measure (Ch.6).

5. There should be a standard description format for Feynman integrals and their analytic and numeric results.

6. More interaction between computer scientists and theoretical physicists is required to solve hard computational issues in physics.

7. Algorithmic details should be published in papers just like formulas, for the benefit of reproducibility and to allow others to improve the algorithms.

8. The free computer algebra system FORM (or a similar system) should be financially supported by the community that greatly benefits from it.

9. In many research fields, students have to handle large amounts of data, or have to perform complicated algebraic manipulations. Currently, the students are ill-prepared for such tasks. Therefore, more emphasis should be placed on data science, e.g., in physics education.

10. Professors should spend more time on research than on teaching. Specifically, teaching bachelor courses (where no expert knowledge is required) should be done by dedicated teachers.

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