



Feynman Diagram Sampling for Quantum Field Theories on the QPACE 2 Supercomputer

By Rappl, Florian

Condition: New. Publisher/Verlag: Universitätsverlag Regensburg | Diss. | This work discusses the application of Feynman diagram sampling in quantum field theories. The method uses a computer simulation to sample the diagrammatic space obtained in a Series expansion. For running large physical simulations powerful computers are obligatory, effectively splitting the thesis in two parts. The first part deals with the method of Feynman diagram sampling. Here the theoretical background of the method itself is discussed. Additionally, important statistical concepts and the theory of the strong force, quantum chromodynamics, are introduced. This Sets the context of the simulations. We create and evaluate a variety of models to estimate the applicability of diagrammatic methods. The method is then applied to sample the perturbative expansion of the vertex correction. In the end we obtain the value for the anomalous magnetic moment of the electron. The second part looks at the QPACE 2 supercomputer. This includes a short introduction to supercomputers in general, as well as a closer look at the architecture and the cooling system of QPACE 2. Guiding benchmarks of the InfiniBand network are presented. At the core of this part, a collection of best practices and useful programming concepts are outlined, which enables the...



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