



Prof. Dr. Stefan Weinzierl

Hidden mathematical beauty in scattering amplitudes

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Campus am Neuen Palais
Haus 8, Raum 0.53
Am Neuen Palais 10
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This talk will be on a topic related to mathematics and (particle) physics. Scattering amplitudes in particle physics are related to the probability with which a certain scattering process occurs. The scattering amplitudes are calculable in perturbation theory. Higher orders in the perturbative expansion are needed for precision predictions for the experiments at the LHC collider. Recent progress in the calculation of scattering amplitudes has shown that these scattering amplitudes have a much simpler structure than previously believed. This simplicity is directly related to mathematical structures hiding underneath.

The complexity of scattering amplitudes increases with the number of external legs and with the number of internal loops. Simplicity with respect to the number of external legs is obtained by formulating the theory not in space-time, but in twistor space instead. Simplicity with respect to the number of internal loops is obtained by making use of the algebra of transcendental functions, like the algebra of multiple polylogarithms. Here, particle physics touches the domain of the theory of motives.

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