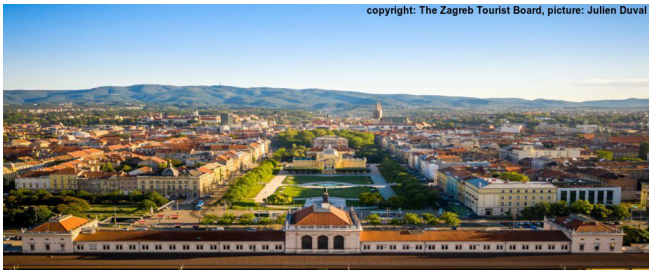

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Four-loop scattering amplitudes journey into the forest

Thursday 15 July 2021 11:00 (30 minutes)

A crucial challenge in perturbative Quantum Field Theory is the description of quantum fluctuations at high-energy scattering processes by the calculation of multi-loop scattering amplitudes. Aiming for improving the efficiency of these computations, we delve into a new technique based on the Loop-Tree Duality (LTD). We analyse the multiloop topologies that appear for the first time at four loops and manage to assemble them in general expression, the N^4MLT universal topology. Based on the fact that the LTD enables to open any scattering amplitude in terms of convolutions of known subtopologies, we obtained the dual representation of the universal N^4MLT topology and determined the internal causal structure of the entire amplitude. Remarkably, we verified the causal conjecture for the N^4MLT family and present explicit causal representations of selected configurations, allowing a more efficient numerical implementation due to the absence of non-causal singularities.

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