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From Correlation Functions to Event Shapes

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We present an approach to computing energy-energy correlations (EEC) directly from finite correlation functions. In this way, one completely avoids infrared divergences. In maximally supersymmetric Yang-Mills theory (N=4 sYM), we derive a new, extremely simple formula relating the EEC to a triple discontinuity of a four-point correlation function. We use this formula to compute the EEC in N=4 sYM at next-to-next-to-leading order in perturbation theory. Furthermore, the method can be applied to calculating event shapes in QCD based on correlation functions of conserved currents. As a proof of concept, we compute the correlation function of four electromagnetic currents at next-to-leading order and explain in detail the steps needed to extract the event shape from it.

Secondary track (number)

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