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The flat space limit of AdS/CFT and soft theorems

Friday 12 June 2020 12:00 (30 minutes)

The flat space limit of the AdS/CFT correspondence allows to relate S-matrix elements of flat space scattering to CFT correlation functions. In this talk I will discuss this construction and its implications for the case of Quantum Electrodynamics.

To obtain the precise dictionary between CFT operators and the S-matrix, one reconstructs the Maxwell field close to the center of AdS in terms of CFT operators. One then takes the flat space limit and uses the LSZ prescription to extract creation/annihilation operators, whose correlation functions yield S-matrix elements. In the infrared, QED has a rich structure which is exemplified by the existence of soft theorems. Soft theorems describe the universal behavior of scattering amplitudes under addition of soft photons. I will argue that they arise as a consequence of Ward identities of the U(1) current dual to the Maxwell field in AdS. In four dimensions, there is also the possibility of quantizing fields on AdS with a different boundary condition at infinity. This is related to electric-magnetic duality and repeating the above argument yields “magnetic” soft theorems.

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