

The Double Copy: A Duality for Particles and Gravity

Monday 15 July 2024 17:10 (20 minutes)

An open problem in theoretical physics is to combine all four of the fundamental forces of nature into one single theory. Problematically, gravity has proven difficult to reconcile with the other forces. Recently, relationships between scattering amplitudes (the quantity related to the probability for an interaction to occur between two or more particles) in non-abelian gauge theories (such as the theory of quarks and gluons) and theories of quantum gravity have led to the discovery of a relation known as the double copy. The double copy relates scattering amplitudes in quantum gravity as the square for those in non-abelian gauge theories. This property has been extended to relate solutions in classical electromagnetism with those in general relativity, via a theory known as the classical double copy.

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Session Classification: Student talks