学术报告

Title: **The Chinese Magic and Hidden Simplicity of Quantum Yang-Mills Theory**

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Abstract

In last decade or so, the study of many-particle on-shell scattering amplitudes in quantum field theory, particularly in quantum Yang-Mills theory, has drawn much attention in particle physics community. These progresses started, more than 30 years ago, with the spinor-helicity formalism proposed by Zhan Xu, Dahua Zhang and Lee Chang (XZC) at Tsinghua University. It greatly simplified the computation of a large class of many-particle amplitudes, and therefore is called the Chinese Magic. In last three years, a new formula based on the so-called scattering equations, has been proposed by Cachazo, He and Yuan (CHY) for many-particle on-shell scattering amplitudes in arbitrary dimensions. My collaborators and I have been able to directly evaluated the CHY formula for quantum Yang-Mills theory, Einstein gravity and Einstein-Yang-Mills theory (EYM) in four dimensions, using the XZC's spinor-helicity technique. For tree-level MHV (Most-Helicity-Violating) amplitudes, besides reproducing the old known formula, our evaluation produces new simple and explicit expressions for Einstein gravity and EYM theory. Out of curiosity, we cannot help ask: Is there something profound behind the amazing simplicity in quantum Yang-Mills amplitudes?