PHYSICS AND ASTRONOMY

COLLOQUIUM

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"Unification from Scattering Amplitudes"

Abstract

Scattering amplitudes are fundamental observables that encode the dynamics of interacting particles. In this talk, I describe how to systematically construct these objects without reference to a Lagrangian or an underlying spacetime. The physics of real-world particles like gravitons, gluons, and pions are thus derived from the properties of amplitudes rather than vice versa. Remarkably, the expressions gleaned from this line of attack are marvelously simple, revealing new structures long hidden in plain sight. As an example, I describe how gravitons are in a very precise way equivalent to products of gluons---a fact with far-reaching theoretical and phenomenological applications. Lastly, I show how gravity serves as the "mother of all theories" whose amplitudes secretly unify, among others, all gluon and pion amplitudes.

Wednesday, November 07, 2018
3:30 p.m.
Bob Wright Centre Building
Room A104