Title: Modern Methods to Understand Scattering Amplitudes

Abstract: Modern approaches to calculating scattering amplitudes in quantum field theory exploit redundancies in the traditional "Feynman diagram" method to streamline the calculation, providing a powerful tool to calculate high precision results at the LHC and uncover deeper mathematical structures in quantum field theory. Interestingly, it is the symmetries of the underlying field theory that manifest themselves as properties of and relations among Feynman diagrams. This leads us to the natural question: to what extent can one determine scattering amplitudes using symmetry principles alone? And is there a more fundamental way to calculate these observables? We discuss some answers to these questions in this talk involving on-shell recursion relations, positive geometries and more.