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Cluster Algebras for Feynman Integrals

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A wealth of physical information may be inferred from the singularities of scattering amplitudes. For the simplest interacting gauge theory, these singularities have been found to be encoded in beautiful mathematical objects known as cluster algebras. In this talk, I present evidence that cluster algebras may underlie the analytic structure of general quantum field theories. In particular, I show that they describe the singularities of a considerable number of Feynman integrals in dimensional regularization, most notably those governing Higgs plus jet amplitudes in QCD. This opens for the first time the exciting prospect of applications of cluster algebras to future collider physics calculations, for example via novel bootstrap methods that evade the formidable task of direct integration.

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