Nathan Reading

Scatter, cluster, scatter, model

Abstract

Cluster algebras were invented/discovered in order to understand total positivity. But almost immediately, mathematicians (and later physicists) started finding connections between the combinatorics/geometry/algebra of cluster algebras and other areas of mathematics and physics. Most relevant for this talk are two connections: In one direction, the theory of scattering diagrams (mirror symmetry/Donaldson-Thomas theory/ integrable systems) has been applied to prove key structural results about cluster algebras. In the other direction, certain cluster algebras seem to be relevant to the computation of scattering amplitudes in physics.

The title of this talk is also an outline. I will introduce scattering diagrams, then introduce cluster algebras, and connect the two. Then I will give a naïve summary of the observed connections between cluster algebras and scattering amplitudes, to motivate the idea that a physicist might be interested in combinatorial models for cluster algebras/scattering diagrams. I will conclude with a survey of the state of research on these combinatorial models, focusing on the models that I have worked most closely with.