

The Combinatorics of Amplituhedra and Cluster Algebras

Saturday 20 July 2024 14:30 (15 minutes)

In this talk we will discuss how two objects of great interest to both physicists and mathematicians are connected.

On one hand, *amplituhedra* are the image under a linear map of the positive part of the Grassmannian – where all the Pluckers are nonnegative. Introduced by physicists to encode scattering amplitudes in N=4 super Yang-Mills theory, they are semi-algebraic sets which generalize polytopes inside the Grassmannian.

On the other hand, *cluster algebras* are a remarkable class of commutative rings with very nice combinatorics introduced by Fomin and Zelevinsky motivated by the study of total positivity. Many nice algebraic varieties are known to have a cluster algebra structure, including the Grassmannian. They also emerged in physics in the context of scattering amplitudes, where they contributed to both conceptual and computational advances. We will show how Amplituhedra possesses surprisingly rich cluster structures and how they relate to their geometry and combinatorics.

Alternate track

I read the instructions above

Yes

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