

Amalgams of matroids, fibre products and tropical graph correspondences

Tuesday, 20 August 2024 10:10 (25 minutes)

We discuss the interplay between certain properties of pairs of matroids and intersection theory of their Bergman fans, which has been extensively studied during the last decade. This provides another connection between tropical algebraic geometry and combinatorics of matroids.

In the first part of the talk, we formulate the theorem claiming that the proper amalgam of two matroids M_1 and M_2 along their common restriction N exists if and only if the tropical fibre product of Bergman fans $B(M_1) \times_{B(N)} B(M_2)$ is positive. In the second part of the talk, we introduce the notion of tropical correspondence. These correspondences are tropical subcycles in the product of Bergman fans, similar to their analogues in algebraic geometry. We define a “graph correspondence” for the maps of lattices of flats and prove that this construction is functorial in the case of “covering” maps of lattices. This is done via explicit combinatorial description involving generalization of Bergman fan which we name a “flag fan”.

We conclude with an overview of the open questions that arise from this perspective.

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