

Rigidity, stress spaces, and lower bound problems on simplicial spheres

Hailun Zheng

Given a simplicial $(d-1)$ -sphere with prescribed numbers of faces in dimensions $0, 1, \dots, i-1$, what is the minimum number of i -dimensional faces it must have? In 1970, McMullen and Walkup formulated the Generalized Lower Bound Conjecture in response to this question. The case $i=2$ was resolved by Kalai in his seminal paper "Rigidity and the lower bound problem I." Since then, rigidity-theoretic methods and their combinatorial incarnations via stress spaces have become central tools in solving lower bound problems in geometric combinatorics. In this talk, I will discuss recent progress on lower bound problems for simplicial spheres. The proofs draw on a blend of techniques from combinatorics, rigidity theory, and commutative algebra. This is joint work with Isabella Novik.