A geometric Littlewood-Richardson rule

Ravi Vakil

Stanford University

ABSTRACT

Littlewood-Richardson coefficients are fundamental constants in several fields of mathematics (and in nature). In combinatorics, they appear in the ring of symmetric functions; in representation theory, they appear in the representations of groups such as GL(n) and S_n. In geometry they turn up in the topology of the Grassmannian, which parametrizes sub-vector spaces of an n-dimensional vector spaces. (This is the ``geometry behind linear algebra''.) I will describe how to interpret Littlewood-Richardson numbers in this way, and show you the key idea behind being able to understand them with pictures (the ``geometric Littlewood-Richardson rule''). I will conclude with a list of applications in several fields, but the main goal of this talk will be to communicate the flavor of the ideas involved. In particular, no background will be assumed, and the talk will not be addressed to experts.