Combinatorial representation theory

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This would be an introduction to modern methods in combinatorial representation theory. The primary tool is the affine Hecke algebra, which comes in many forms: as the group algebra of the symmetric group, as a quiver Hecke algebra, as a convolution algebra of functions on a p-adic group. From this we can derive the structure and combinatorics of the cohomology of flag varieties, projective spaces and Grassmannians, and the detailed "crystal" structure of the representations of complex simple Lie algebras. I will give an introductory tour to these techniques in the interplay between combinatorics, representation theory and geometry.