

Mathematics Department Colloquium

Organizer: Maciej Zworski

Thursdays, 4:10–5:00pm, 60 Evans

February 10 **Sara Billey**, University of Washington

Intersecting Schubert Varieties

Using a blend of combinatorics and geometry, we give an algorithm for algebraically finding all flags in any zero-dimensional intersection of Schubert varieties with respect to three transverse flags, and more generally, any number of flags. In particular, the number of flags in a triple intersection is also a structure constant for the cohomology ring of the flag manifold. Our algorithm is based on solving a limited number of determinantal equations for each intersection (far fewer than the naive approach). These equations are also sufficient for computing Galois groups and monodromy of intersections of Schubert varieties. We are able to limit the number of equations by using the permutation arrays of Eriksson and Linusson. We show that there exists a unique permutation array corresponding to each realizable Schubert problem and give a simple recurrence relation to compute the corresponding rank table. We describe pathologies of Eriksson and Linusson's permutation array varieties, and define the more natural permutation array schemes. In particular, we give several counterexamples to the Realizability Conjecture based on classical projective geometry. Finally, we give examples where Galois/monodromy groups experimentally appear to be smaller than expected.

This is joint work with Ravil Vakil at Stanford University.