Moment Varieties of Measures on Polytopes
Kathlén Kohn, ICERM

This talk brings many areas together: discrete geometry, statistics, algebraic geometry, invariant theory, geometric modeling, symbolic and numerical computations.
We study the algebraic relations among moments of polytopes. This is already a non-trivial matter for quadrangles in the plane. In fact, we need to combine invariant theory of the affine group with numerical algebraic geometry to compute first relevant relations.
Moreover, the numerator of the generating function of all moments of a fixed polytope is the adjoint of the polytope, which is known from geometric modeling in dimensions 2 and 3. Our studies generalize this notion to arbitrary dimensions and solve related open problems.
This talk is based on joint work with Boris Shapiro, Bernd Sturmfels, and Matthew Trager.