Symplectic geometry seminar

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Bahen 6183

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Projective completions of affine varieties via degree-like functions

Given a 'degree like' function δ, i.e. a map of the coordinate ring A of an affine variety X to integers such that $\delta(f+g) \leq \max\{\delta(f), \delta(g)\}$ (with strict inequality implying $\delta(f) = \delta(g)$) and $\delta(fg) \leq \delta(f) + \delta(g)$, one can associate to it a projective completion of X^δ of X. We show that the ideal I_∞ of the hypersurface of 'points at infinity' is radical iff δ is the maximum of finitely many semidegrees (i.e. degree like functions δ' such that $\delta'(fg) = \delta'(f) + \delta'(g)$ for all f, g), which are then in a 1-1 correspondence with the prime components of I_∞.

Given a projective completion Z of X determined by a degree like function δ, we define a 'normalized' degree like function $\bar{\delta}$ which is a maximum of finitely many semidegrees. When X is normal, the corresponding completion is isomorphic to the normalization of Z. The construction of $\bar{\delta}$ from δ generalizes the construction of the normal toric completion X_P of $(C^*)^n$ determined by a convex integral polytope P from the toric variety determined by an arbitrary finite subset S of integral points in P whose convex hull is P. I will describe this construction and the properties of toric completions these are so far known to preserve.