Laurent phenomenon algebras

Thomas Lam

In this talk, we will discuss a generalization of Fomin and Zelevinsky's cluster algebras [FZ], allowing exchange polynomials to be arbitrary irreducible polynomials rather than just binomials. Many of the initial highlights of the theory of cluster algebras have (proven or conjectural) extensions to our Laurent-phenomenon algebras:

1. The Laurent phenomenon holds.

2. There is a large number of finite types with rich polytopal combinatorics. Indeed, any graph associahedron is dual to the cluster complex of some LP algebra.

3. The coordinate rings of subvarieties of the "electrical Lie groups" introduced in [LP] conjecturally have a LP algebra structure.

4. Combinatorial recurrences such as the cube recurrence and Gale-Robinson sequence occur as exchange relations of LP algebras. These recurrences do not fit into the cluster algebra setting.

5. The coefficients of exchange polynomials of LP algebras satisfy interesting dynamics.

The talk will be self-contained and is based on joint work with Pavlo Pylyavskyy.

References

[FZ] S. FOMIN AND A. ZELEVINSKY: Cluster algebras. I. Foundations, *J. Amer. Math. Soc.*, 15 (2002), no. 2, 497–529.

[LP] T. LAM AND P. PYLYAVSKYY: Electrical networks and Lie theory, preprint, 2011; `arXiv:1103.3475`.