Graduate Talk

Breaking Associativity

We investigate algebraic operations $\prec$ and $\succ$ such that their sum $*$ is an associaitve operation:

$$x * y = x \prec y + x \succ y \ .$$

Depending on the axioms satisfied by the two operations $\prec$ and $\succ$ in order to imply the associativity of $*$ we are led to discover new types of algebras with strong relationships with families of polytopes, posets, generating series, a new kind of arithmetic, Hopf algebras over trees (showing up in theoretical physics).

Colloquium I

Algebra, topology and combinatorics of the Stasheff polytope

We investigate the construction of the Stasheff polytopes (and some other families like permutohedrons) and its relationship with posets, and algebra structures.

Colloquium II

Cofree Hopf algebras

A celebrated theorem of Milnor and Moore asserts that a (graded) cofree Hopf algebra which is cocommutative is completely determined by its Lie algebra of primitive elements. We show a similar theorem without the cocommutativity assumption. The role of Lie algebras is played by the so-called B_∞ (or Baues) -algebras. An important by-product is the breaking of the associative operation for these Hopf algebras.