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Noncrossing partitions via representations of quivers

We show how the combinatorics of clusters (viewed as tilting objects in the cluster category) can be related to the combinatorics of the noncrossing partitions of the associated Coxeter group. It is known that, for an arbitrary quiver Q, the tilting objects in the cluster category for Q are in bijection with partial tilting objects in rep Q which are tilting on their support. We show that these are also in bijection with the exact abelian extension-closed subcategories of rep Q. Further, if Q is of finite or affine type, these are also in bijection with the noncrossing partitions of the reflection group associated to Q. When Q is of finite type, we recover Reading's bijection between clusters and noncrossing partitions. This perspective also provides a new proof that, in finite type, the noncrossing partitions form a lattice, which was first given a type-free proof by Brady and Watt in 2005.

This is joint work with Colin Ingalls (UNB).