Title: How can geometry predict isomorphisms of algebras?

Abstract:

In my talk I give an example of how geometry can predict isomorphisms of algebras. The talk is principally about KLR algebras. But the geometric approach in the talk is expected to work for other types of algebras that have geometric constructions. KLR algebras just give an example of how this geometric approach works. The audience is not expected to know about KLR algebras. I will introduce them in the talk.

KLR algebras are introduced by Khovanov-Lauda and Rouquier to categorify the positive part of a quantum group. For each Lie type we can define a KLR algebra of this type. Denote by $R(\widetilde{\mathfrak{sl}}_n)$ the KLR algebra of affine type $\widetilde{\mathfrak{sl}}_n$. We can prove that the algebra $R(\widetilde{\mathfrak{sl}}_n)$ is isomorphic to a subquotient of the algebra $R(\widetilde{\mathfrak{sl}}_{n+1})$.

The most difficult part of the result above is how to guess the correct statement. This can be done using the geometry of flag varieties and quiver varieties.