Workshop in Noncommutative Algebra and Representation Theory

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Title: 'Automorphisms of quantum toroidal algebras from an action of the extended double affine braid group'

Abstract: We construct an action of the extended double affine braid group $\ddot{\mathcal{B}}$ on the quantum toroidal algebra $U_q(\mathfrak{g}_{tor})$ in all untwisted types. In the simply laced cases, using this action and certain involutions of $\ddot{\mathcal{B}}$ we obtain automorphisms and anti-automorphisms of $U_q(\mathfrak{g}_{tor})$ which exchange the horizontal and vertical subalgebras. Moreover, they switch the central elements C and $k_0^{a_0} \ldots k_n^{a_n}$ up to inverse. This generalises existing results in type A due to Miki.

We shall then discuss potential applications of these results to the representation theory of quantum toroidal algebras in ADE types (which is currently work in progress), for example with reference to vertex, geometric and Fock space representations.