

Quantum linear supergroups and their canonical bases

Jie Du

University of New South Wales
UNSW, Sydney
Australia
j.du@unsw.edu.au

It is well known that the most fundamental structure of a universal enveloping algebra associated with a symmetrizable Kac–Moody algebra is stored in a matrix — the Cartan matrix. It is also known that, if the associated Lie algebra is a matrix algebra, then a PBW basis is indexed by certain matrices. In this talk, we will show that, in the type A family — the family of quantum linear groups/supergroups and affine quantum linear groups — there is a new basis for every member of the family, which contains the set of generators, such that the structure constants associated with multiplying a basis element by a generator are completely determined by the labelling matrices. This indicates that further structures of such an object are also stored in matrices.

The first type of such bases was constructed for quantum linear groups two decades ago by Beilinson–Lusztig–MacPherson, using a geometric setting (i.e., the partial flag varieties) for q -Schur algebras. However, for the super and affine cases, purely algebraic and combinatorial approaches have been developed. We will mainly focus on the construction of the quantum linear supergroups in the talk. By this new construction, we will also give a combinatorial construction for the canonical bases of the positive and negative parts and discuss their relationship with the Kazhdan–Lusztig bases for the q -Schur superalgebras and the induced bases for simple polynomial representations.