

RESEARCH PLANS

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My research goal is to generalize important results in the theory of quantum groups to the \imath quantum groups setting based on an idea “The \imath quantum groups are generalizations of the quantum groups” (\imath program) proposed by Bao-Wang. In particular, I aim to describe module structures over \imath quantum groups combinatorially, and apply it to the representation theory of related algebras, and to integrable systems.

(1) **Combinatorial structures in representation theory of the \imath quantum groups.**

I will analyze combinatorial structures obtained in the notion of based modules in representation theory of the \imath quantum groups in a purely combinatorial way. Furthermore, by reinterpreting results to be obtained there in terms of representation theory of the \imath quantum group, I will make both sides ample. From partial results obtained this far, it is expected that such a combinatorial theory provides more natural construction of Bao-Wang’s \imath canonical bases.

(2) **Applications to the quantum Brauer algebra and the Hecke algebra of type B.**

It is known that the \imath quantum groups of type AI and AIII are closely related to the quantum Brauer algebra and the Hecke algebra of type B, respectively (Schur duality). Using this fact and the theory of based modules in representation theory of \imath quantum groups, I will study the cellular structures of the quantum Brauer algebra and the Hecke algebra of type B. This is also important for applications to modular representation theory of these algebras.

(3) **Representation theory of affine \imath quantum groups and integrable systems.**

It is known that certain representations of affine \imath quantum groups play important roles in integrable systems. I will study representation theory of affine \imath quantum groups which lies behind this fact. Especially, I aim to generalize the theory of R -matrices, affinizations, crystal bases, and so on in representation theory of the affine quantum groups to the affine \imath quantum groups setting.