ARANO, Yuki Associate Professor

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Membership of Academic Societies:
The Mathematical Society of Japan

Research Interest:

- Operator algebra
- Quantum group
- Tensor category

Research Summary:

An operator algebra is a certain subalgebra of the algebra of all bounded operators on a Hilbert space. Such algebra can be seen as a "noncommutative version" of the algebra of all continuous functions on a topological space. In the operator algebraic quantum group theory, we study the group structure on such "noncommutative" space. Not only such quantum group gives important examples of operator algebras, but also this appears as an analogue of the Galois group in the subfactor theory.

My interest is the repretation theoretic/topological aspects of quantum groups. Along this line, I also worked on the actions of quantum groups on operator algebras and more general tensor categories etc.

Major Publications:

[1] Y. Arano, Unitary spherical representations of Drinfeld doubles. *J. Reine Angew. Math.* **742** (2018), 157–186
[2] Y. Arano, Comparison of unitary duals of Drinfeld doubles and complex semisimple Lie groups. *Comm. Math. Phys.* **351** (2017), no.3, 1137–1147.
[3] Y. Arano, Y. Isono. A. Marrakchi, Ergodic theory of affine isometric actions on Hilbert spaces, *Geom. Funct. Anal.* **31** (2021), no.5, 1013–1094.

Awards and Prizes:

- 2017, The Takebe Katahiro Prize for Encouragement of Young Researchers, "Studies of operator algebraic quantum groups"

Education and Appointments:

2017 Assitant professor, Kyoto University
2023 Associate professor, Nagoya University

Message to Prospective Students:

Standard textbooks on my field are, for example,

- Murphy, Gerard J. C*-algebras and operator theory. Academic Press, Inc., 1990
- Jantzen, Jens Carsten. Lectures on quantum groups. Graduate Studies in Mathematics, 6. American Mathematical Society,, 1996
- Neshveyev, Sergey ; Tuset, Lars. Compact quantum groups and their representation categories. Cours Spécialisés, 20. Société Mathématique de France, 2013.

but you may study anything related to operator algebras and quantum groups.

During the seminar, I would recommend you not to see any memos. This does not mean you need to memorize everything. You need to understand the contents as deep as, for example, the high school math. (I suppose you can talk about the definition and the basic properties of a derivative of a single variable without seeing anything.)

You are required to understand calculus, linear algebras, topology, basic group theory, measure theory, Fourier analysis and functional analysis before entering the graduate school. Undrstanding any further math such as representation theory, probability theory, algebraic topology and mathematical physics would be appreciated, but deep understanding of basic math is much more important.