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Research field: Operator Algebras
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Current Research

I study theory of operator algebras. It is divided into two theories, one on C*-algebras initiated by Gelfand-Naimark and another on von Neumann algebras initiated by Murray-von Neumann. I mainly study the latter.

I initially studied classification of group actions on von Neumann algebras, and around 1990, I started to study theory of subfactors initiated by Jones and developed by Ocneanu. Around 2000, I started to study operator algebraic approach to conformal field theory, which is a part of algebraic quantum field theory. These topics are mutually closely related and have been naturally developed.

Theory of subfactors has two aspects, one on the combinatorial and algebraic side, and the other on the analytic side. I study and like both aspects. My studies on these topics in 1990's have been compiled into the following book.

D. E. Evans & Y. Kawahigashi, "Quantum Symmetries on Operator Algebras", Oxford Mathematical Monographs, Oxford University Press, 1998.

Recently I apply subfactor theory to quantum field theory, together with mathematical physicists. I am also interested in another mathematical approach to conformal field theory, that is theory of vertex operator algebras. My study is on the mathematical side of the theory, and I do not study physics itself.

My web site
http://www.ms.u-tokyo.ac.jp/~yasuyuki/
has various related pieces of information.

Prerequisites

I hope my students have studied the following before starting a graduate study.
(1) Lebesgue integration theory (exchange of the order of limits and integrals, convolution, Lp-spaces)

(2) Fourier transform (the Riemann-Lebesgue theorem, the Plancherel theorem)
(3) Functional analysis (basic properties of bounded linear operators, the Hahn-Banach theorem, spectral decomposition)
(4) Basics of theory of operator algebras (functional calculus within a C*-algebra, the Gelfand-Naimark theorem)

If one does not understand (1), then it would be impossible to work with me. Those without a firm understanding of (2), (3) would also have difficulty. If one hopes to obtain a Ph.D. and an academic position, then understanding (4) would give better chances and more choices. Theory of operator algebras is related to many different topics, so knowledge on representation theory, probability theory, topology, differential geometry, homological algebra and mathematical physics would be an advantage. However, knowing many things is not a sufficient or necessary condition to make a mathematical research.
Zeal and potential ability can compensate for lack of knowledge.
English language is also important.

Any topic related to theory of operator algebras in a broad sense would be fine and a student does not have to work on the same topics as I at all. One should study what interests him or her most.
Going abroad is strognly encouraged. An academic position is getting harder to find, but if one can teach in English, one has a better chance.

I hope a student who loves mathematics will come.