Department of Mathematics, University of California, Berkeley

Operator Algebras Seminar

Organizer: W. Arveson

Wednesday, 2:00–4:00pm, 939 Evans

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25 Aug.   **No Meeting**,

The central topic this semester will be noncommutative Poisson boundaries. These are noncommutative generalizations of the "Poisson boundary" of the space of all bounded harmonic functions on the open unit disk, or on a domain in $\mathbb{C}^n$, or on a complete Riemannian manifold.

The noncommutative counterpart of the Laplacian is the generator of a semigroup of completely positive maps acting on a von Neumann algebra M, and the space $H(M)$ of noncommuative harmonic functions is the space of all elements of M that are fixed under the action of the semigroup. $H(M)$ is an operator system; and while it is almost never closed under the multiplication of M, it has a (unique) new multiplication with respect to which it is a von Neumann algebra $bH(M)$. The von Neumann algebra $bH(M)$ is the noncommutative Poisson boundary of $H(M)$.

Sept. 1   **Bill Arveson**, UC Berkeley
Organizational Meeting

I hope to make this seminar comprehensible to anyone with basic knowledge of operator theory on Hilbert spaces. I will begin by giving an exposition of the basic theory of completely positive maps on von Neumann algebras, and discuss how one can interpret classical harmonic functions in terms of semigroups of positive maps on the space $L^\infty(M)$ of a complete Riemannian manifold M. Then we will work through a recent paper of Masaki Izumi.