Operator Algebras Seminar

Organizer: W. Arveson

Wednesdays, 2–3 pm, 961 Evans

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26 Sept. **Bill Arveson**, UC Berkeley

Marginal traces and completely positive maps

There is an affine bijection between the convex set of all normal states ρ of $\mathcal{B}(H) \otimes \mathcal{B}(H)$ that satisfy $\rho(a \otimes \mathbf{1}) = \rho(\mathbf{1} \otimes a) = \omega(a)$ and the set of completely positive maps $\phi : \mathcal{B}(H) \to \mathcal{B}(H)$ that satisfy $\phi(\mathbf{1}) = \mathbf{1}$ and $\omega \circ \phi = \omega$. This allows one to understand the convex geometry of marginal traces by analyzing certain completely positive maps, and we describe progress on the problem of identifying and classifying extremal completely positive maps on $\mathcal{B}(H)$.

When applied to the case of marginal traces on matrix algebras, these infinite-dimensional results imply that the extremal marginal traces of rank 2 are an open dense subset of the set of all marginal traces of rank ≤ 2. Significantly, such extremals also turn out to be maximally entangled states. In subsequent talks of this series, we'll discuss open problems and opportunities.