PM 822 Seminar Topics

Pick one of these papers or get my approval for something else. The talks will be 25 minutes long, and should survey the ideas and prove a few key things. Talks will be in the last week of March or the first week of April.

(1) W.B. Arveson, *Subalgebras of C*-algebras III*, Acta Math. **181** (1998), 159–228.
He proves a dilation theorem for a row contraction of commuting operators, and computes the C*-envelope.

(2) C.A. Berger, *A strange dilation theorem*, 1965, unpublished.
See Sz.Nagy–Foiaş chapter I.11. A ρ-dilation of $T \in \mathcal{B}(\mathcal{H})$ is a unitary U on a larger space $\mathcal{K}$ such that $T^n = \rho P_{\mathcal{H}} U^n|_{\mathcal{H}}$. These operators are characterized. $\rho = 2$ yields Berger's theorem.

(3) J.W. Bunce, *Models for n-tuples of noncommuting operators*, J. Func. Anal. **57** (1984), 21–30.
If T_i are operators such that $\sum_i T_i T_i^* \le I$, then they may be simultaneously dilated to isometries with pairwise orthogonal range. The minimal dilation is unique (G. Popescu, *Isometric dilations for infinite sequences of noncommuting operators*, Trans. Amer. Math. Soc. **316** (1989), 523–536).

(4) E. Christensen, *Extensions of derivations II*, Math. Scand. **50** (1982), 111–122.
All derivations from a C*-algebra $\mathfrak{A}$ into $\mathcal{B}(\mathcal{H})$ are inner if and only if they are completely bounded if and only if for all $T \in \mathcal{B}(\mathcal{H})$, one has $\operatorname{dist}(T, \mathfrak{A}') \le K\|\delta_T|_{\mathfrak{A}}\|$.

(5) K.R. Davidson and E.G. Katsoulis, *Semicrossed products of the disc algebra*, Proc. Amer. Math. Soc. **140** (2012), 3479–3484.
Computes the C*-envelope of the semicrossed product of the disc algebra by an endomorphism.

(6) R.G. Douglas and V.I. Paulsen, *Completely bounded maps and hypo-Dirichlet algebras*, Acta Sci. Math. (Szeged) **50** (1986), 143–157.
If X is a finitely connected domain in $\mathbb{C}$ with nice boundary and T has X as a spectral set, then T is similar to an operator which has a normal ∂X-dilation.

(7) E.T.A. Kakariadis, *The Shilov Boundary for Operator Spaces*, arXiv:1204.4495.
He provides a simpler proof of Hamana's Theorem that every operator system is contained in a unique injective envelope. This yields the original proof of the existence of the C*-envelope as a corollary.

(8) P. Muhly and B. Solel, *On the uniqueness of operator algebra structures*, Indiana Univ. Math. J. **46** (1997), 575–591.
A subalgebra of the $n \times n$ matrices containing the diagonal algebra has a unique operator algebra structure if and only if every contractive representation is completely contractive.

(9) V.I. Paulsen, S.C. Power and J.D. Ward, *Semidiscreteness and dilation theory for nest algebras*, J. Funct. Anal. **102** (1988), 76–87.
The dilation theory for the upper triangular matrices is extended to infinite dimensions for weak-$*$ continuous representations by approximating infinite nest algebras by finite nest subalgebras.

(10) G. Pisier, *Joint similarity problems and the generation of operator algebras with bounded length*, Int. Equations & Oper. Theory **31** (1998), 353–370.
There are two commuting operators which are each separately similar to a contraction, but their product is not polynomially bounded; whence they are not jointly similar to contractions. Similar results for group representations.

(11) D. Sarason, *Generalized interpolation in H^∞*, Trans. Amer. Math. Soc. **127** (1967), 179–203.
He solves the Nevanlinna-Pick interpolation problem: given $z_1, \dots, z_n \in \mathbb{D}$ and scalars (or matrices) $w_1, \dots, w_n$, when is there an analytic function $f(z)$ on $\mathbb{D}$ bounded by 1 so that $f(z_i) = w_i$? by applying the commutant lifting theorem. But the CLT did not yet exist—he proved the first important case.

(12) R.R. Smith, *Completely bounded module maps and the Haagerup tensor product*, J. Funct. Anal. **102** (1991), 156–175.
If $\mathfrak{A}$ and $\mathfrak{B}$ are C*-algebras with cyclic vector, then every bounded bimodule map from an $\mathfrak{A}$–$\mathfrak{B}$ bimodule into $\mathcal{B}(\mathcal{H})$ is completely bounded. Also a nice structure theorem is obtained for $\mathfrak{A}$–$\mathfrak{B}$ bimodule maps of the compact operators into $\mathcal{B}(\mathcal{H})$.

(13) J.W. Bunce, *The similarity problem for representations of C*-algebras*, Proc. Amer. Math. Soc. **81** (1981), 409–414.
Every representation of a nuclear C*-algebra is similar to a $*$-representation. Also proven by E. Christensen, Amer. J. Math. **103** (1981), 817–833.