ANALYSIS SEMINAR

Exposed and strongly exposed points in symmetric spaces of measurable operators

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Abstract: *Let $\mathcal{M}$ be a semifinite von Neumann algebra with a faithful, normal, semifinite trace τ, and E be a symmetric Banach function space on $[0, \tau(\mathbf{1}))$. The symmetric spaces $E(\mathcal{M}, \tau)$ of τ-measurable operators consists of all τ-measurable operators x for which the singular value function $\mu(x)$ belongs to E and is equipped with the norm $\|x\|_{E(\mathcal{M},\tau)} = \|\mu(x)\|_E$. Special cases of noncommutative symmetric spaces are the following well known spaces: $L_p(\mathcal{M}, \tau)$-noncommutative L_p-spaces; unitary matrix spaces C_E; Schatten spaces C_p, in particular trace class C_1 and the class of Hilbert-Schmidt operators C_2.*

Let $(X, \|\cdot\|)$ be a Banach space, with the unit sphere and the unit ball denoted by S_X and B_X, respectively. An element $x \in S_X$ is an exposed point *of B_X if there exists a normalized functional $F \in X^*$ which supports B_X exactly at x, i.e. $F(x) = 1$ and $F(y) \neq 1$ for every $y \in B_X \setminus \{x\}$.*

Let $x \in S_X$ be an exposed point of B_X and suppose that the functional F exposes B_X at x. If $F(x_n) \to 1$ implies $\|x - x_n\| \to 0$ for all sequences $\{x_n\} \subset B_X$, then x is a strongly exposed point *of B_X and F* strongly exposes *B_X at x.*

We will discuss the relationships between exposed and strongly exposed points of the unit ball of an order continuous symmetric function space E, and of the unit ball of the space of τ-measurable operators $E(\mathcal{M}, \tau)$.