

Jon Bannon, Siena College.

Title: Correspondences and Haagerup's Approximation Property

Abstract: A finite von Neumann algebra M with a faithful normal trace τ has Haagerup's approximation property (relative to a von Neumann subalgebra N) if there exists a net $(\phi_\alpha)_{\alpha \in \Lambda}$ of normal completely positive (N -bimodular) maps from M to M that satisfy the subtracial condition $\tau \circ \phi_\alpha \leq \tau$, the extension operators T_{ϕ_α} are bounded compact operators (in $\langle M, e_N \rangle$), and pointwise approximate the identity in the trace-norm, i.e., $\lim_\alpha \|\phi_\alpha(x) - x\|_2 = 0$ for all $x \in M$. We prove that the subtraciality condition can be removed, and provide a description of Haagerup's approximation property in terms of Connes's theory of correspondences. We show that if $N \subseteq M$ is an amenable inclusion of finite von Neumann algebras and N has Haagerup's approximation property, then M also has Haagerup's approximation property. This work answers two questions of Sorin Popa.