Wenjing Liu
University of New Hampshire

An extension of the Beurling-Chen-Hadwin-Shen theorem for noncommutative Hardy spaces associated with finite von Neumann algebras

Abstract

In 2015, Yanni Chen, Don Hadwin and Junhao Shen proved a noncommutative version of Beurling's theorem for a continuous unitarily invariant norm α on a tracial von Neumann algebra (M, τ) such that α is one dominating with respect to τ. The role of H^∞ is played by a maximal subdiagonal algebra A. In the talk, we first will show that if α is a continuous normalized unitarily invariant norm on (M, τ), then there exists a faithful normal tracial state ρ on M and a constant $c > 0$ such that α is a c times one norm-dominating norm on (M, ρ). Moreover, $\rho(x) = \tau(xg)$, where $x \in M$, g is positive in $L^1(Z, \tau)$, where Z is the center of M. Here c and ρ are not unique. However, if there is a c and ρ so that the Fuglede-Kadison determinant of g is positive, then Beurling-Chen-Hadwin-Shen theorem holds for $L^{(\alpha)}(M, \tau)$. The key ingredients in the proof of our result include a factorization theorem and a density theorem for for $L^{(\alpha)}(M, \rho)$.

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