

Hilbert transforms on graph products of finite von Neumann algebras

Xiaoqi Lu

The boundedness of Fourier multipliers on non-commutative L_p -spaces ($1 < p < \infty$) is a fundamental problem in non-commutative analysis. Building on the non-commutative Cotlar identity introduced by Mei and Ricard (2017), which yields L_p -boundedness ($1 < p < \infty$) of Hilbert transforms on amalgamated free products of finite von Neumann algebras, their approach relies heavily on freeness in the underlying free product structure. In this talk, we introduce a new strategy that overcomes this limitation. Our approach combines a generalized Cotlar identity, which holds on suitable subspaces and captures non-freeness information, with the property of Rapid Decay to control the remaining components. From this framework, we establish the L_p -boundedness ($1 < p < \infty$) of Rademacher-type Hilbert transforms on graph products of finite von Neumann algebras. This unified framework extends earlier results for free products of finite von Neumann algebras and for graph products of groups acting on right-angled buildings. This is a joint work with Runlian Xia.