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Rigidity in group von Neumann algebra

In the mid thirties F. J. Murray and J. von Neumann found a natural way to associate a von Neumann algebra L(G) to every countable discrete group G. Classifying L(G) in terms of G emerged from the beginning as a natural yet quite challenging problem as these algebras tend to have very limited "memory" of the underlying group. This is perhaps best illustrated by Connes' famous result asserting that all icc amenable groups give rise to isomorphic von Neumann algebras; thus in this case, besides amenability, the algebra has no recollection of the usual group invariants like torsion, rank, or generators and relations. In the non-amenable case the situation is radically different; many examples where the von Neumann algebraic structure is sensitive to various algebraic group properties have been discovered via Popa's deformation/rigidity theory. In this talk I will present several new instances where the von Neumann algebra completely retains canonical algebraic constructions in group group theory such us direct product, amalgamated free product, or wreath product.