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Exotic C-algebras of geometric groups*

We consider a new class of potentially exotic group C*-algebras $C^*(\mathrm{PF}_p^*(G))$ for a locally compact group G, and its connection with the class of potentially exotic group C*-algebras $C^*_{L^p}(G)$ introduced by Brown and Guentner. Surprisingly, these two classes of C*-algebras are intimately related. By exploiting this connection, we show $C^*_{L^p}(G) = C^*(\mathrm{PF}_p^*(G))$ for $p \in (2, \infty)$, and the C*-algebras $C^*_{L^p}(G)$ are pairwise distinct for $p \in (2, \infty)$ when G belongs to a large class of nonamenable groups possessing the Haagerup property and either the rapid decay property or Kunze-Stein phenomenon by characterizing the positive definite functions that extend to positive linear functionals of $C^*_{L^p}(G)$ and $C^*(\mathrm{PF}_p^*(G))$. This greatly generalizes earlier results of Okayasu and the second author on the pairwise distinctness of $C^*_{L^p}(G)$ for $2 < p < \infty$ when G is either a noncommutative free group or the group $\mathrm{SL}(2, \mathbb{R})$, respectively.

This is a joint work with M. Wiersma.