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*C\*-norms for tensor products of discrete group C\*-algebras*

A  $C^*$ -algebra  $\mathcal{A}$  is said to be nuclear if the algebraic tensor product  $\mathcal{A} \otimes \mathcal{B}$  admits a unique  $C^*$ -norm for every  $C^*$ -algebra  $\mathcal{B}$ . Lance showed in 1973 that a discrete group  $\Gamma$  is amenable if and only if  $C_r^*(\Gamma)$  is nuclear. We are able to show that if  $\Gamma$  is nonamenable, then  $C_r^*(\Gamma) \otimes C_r^*(\Gamma)$  and  $C^*(\Gamma) \otimes C_r^*(\Gamma)$  admit nonunique  $C^*$ -norms. Further, when  $\Gamma_1$  and  $\Gamma_2$  contain copies of noncommutative free groups, then  $C_r^*(\Gamma_1) \otimes C_r^*(\Gamma_2)$  and  $C^*(\Gamma_1) \otimes C_r^*(\Gamma_2)$  admit  $2^{\aleph_0}$  distinct  $C^*$ -norms.