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Characterizing traces on crossed products of noncommutative C*-algebras

Given a discrete group G acting on a unital C*-algebra A, a crossed product is a C*-algebra containing a copy of G (as unitaries) and A, where the action of G on A is now inner. This comes in two main flavours - the universal crossed product $A \rtimes G$ and the reduced crossed product $A \rtimes_r G$.

We give complete descriptions of the tracial states on both the universal and reduced crossed products. In particular, we also answer the question of when the tracial states are in canonical bijection with the G-invariant tracial states on A. This generalizes the unique trace property for discrete groups. The analysis simplifies greatly in various cases, such as in the case of FC groups, more so for abelian groups, and even more so in the case of $G = \mathbb{Z}$. In other cases, we obtain previously known results, for example when $A = C(X)$.