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*Lifting  $KK$ -elements, asymptotical unitary equivalence and the classification of simple  $C^*$ -algebras*

Two existence theorems concerning  $KK$ -elements and rotation maps are proved. More precisely, let  $A$  and  $B$  be simple unital AH-algebras (with slow dimension growth) of real rank zero. Then any positive element in  $KK(A, B)$  can be lifted to a homomorphism from  $A$  to  $B$ . Moreover, if  $A$  is a unital subalgebra of  $B$ , the embedding can be perturbed by an approximated inner automorphism of  $B$  to realize any given rotation map, but keep the induced  $KK$ -element unchanged.

These two existence theorems were used in the classification of simple  $C^*$ -algebras which are tracially AF after tensoring a UHF algebra.

This is a joint work with Huaxin Lin.