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*Weak Rokhlin Property and Weak Tracial Approximation*

Consider a minimal  $C^*$ -dynamical system  $(A, \Gamma)$ , where  $A$  is a unital  $C^*$ -algebra and  $\Gamma$  is a discrete amenable group. Let us study the structure of the crossed product  $C^*$ -algebra  $A \rtimes \Gamma$ . Assume the system  $(A, \Gamma)$  has the Weak Rokhlin Property (WRP), then the crossed product  $C^*$ -algebra  $A \rtimes \Gamma$  is shown to be weakly tracially approximated by matrix algebras over hereditary sub- $C^*$ -algebras of  $A$ . As a consequence, if  $A$  locally has finite nuclear dimension, then  $C^*$ -algebra  $A \rtimes \Gamma$  is  $\mathcal{Z}$ -stable if, and only if,  $\text{Cu}(A \rtimes \Gamma) \cong \text{Cu}((A \rtimes \Gamma) \otimes \mathcal{Z})$ . Moreover, in the case that  $|\Gamma| = \infty$ , the  $C^*$ -algebra  $A \rtimes \Gamma$ ,  $\mathcal{Z}$ -stable or not, always has stable rank one if  $(A, \Gamma)$  has the property of Cuntz comparison of Open Sets (COS). It is also studied when the properties (WRP) and (COS) hold. This is a joint work with George Elliott, Chun Guang Li, and Qingyun Wang.