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### **Algebraic entropy for amenable semigroup actions on abelian groups.**

**Abstract:** Using a recent extension of Ornstein-Weiss Theorem (and Fekete's Lemma) to cancellative amenable semigroups, due to T. Ceccherini Silberstein, M. Coornaert and F. Krieger, we generalize the notion of algebraic entropy  $h_{alg}$  of J. Peters and M. D. Weiss to every right action  $S \curvearrowright^\alpha A$  of a cancellative left-amenable semigroup  $S$  on a discrete abelian group  $A$ . We prove the so-called Addition Theorem in case  $A$  is torsion, that is, if  $B$  is an  $\alpha$ -invariant subgroup of  $A$ , then

$$h_{alg}(\alpha) = h_{alg}(\alpha_B) + h_{alg}(\alpha_{A/B}),$$

where  $S \curvearrowright^{\alpha_B} B$  and  $S \curvearrowright^{\alpha_{A/B}} A/B$  are the actions induced by  $\alpha$  on  $B$  and  $A/B$  respectively. Moreover, we extend the so-called Bridge Theorem of M. Weiss, that connects the algebraic entropy to the topological entropy  $h_{top}$  defined for compact topological spaces by R. L. Adler, A. G. Konheim and M. H. McAndrew. Indeed, T. Ceccherini Silberstein, M. Coornaert and F. Krieger extended the notion of  $h_{top}$  to left actions of cancellative left-amenable semigroups on compact topological spaces, and we prove that, if  $A$  is torsion, then

$$h_{alg}(\alpha) = h_{top}(\widehat{\alpha}),$$

where  $S \curvearrowright^{\widehat{\alpha}} \widehat{A}$  is the action induced by  $\alpha$  on the compact Pontryagin dual group  $\widehat{A}$  of  $A$ . (joint work with D. Dikranjan and A. Fornasiero)