



# Entropy of automorphisms, homology and the intrinsic polynomial structure of nilpotent groups

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We study the word length entropy of automorphisms of residually nilpotent groups, and how the entropy of such group automorphisms relates to the entropy of induced automorphisms on various nilpotent quotients. We show that much like the structure of a nilpotent group is dictated to a large degree by its abelianization, the entropy of an automorphism of a nilpotent group is dictated by its entropy on the abelianization. We give some applications to the study of pseudo-Anosov homeomorphisms of surfaces. In particular, we show that if  $\psi$  is a non-homological pseudo-Anosov homeomorphism of a surface  $\Sigma$  with dilatation  $K$  and  $N$  is any nilpotent quotient of any finite index characteristic subgroup of  $\pi_1(\Sigma)$  to which  $\psi$  descends, the entropy of  $\psi$  viewed as an automorphism of  $N$  is bounded away from  $K$ . This answers a question of D. Sullivan.

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