

Modern notions of entropy in ergodic theory and representation theory

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Soon after Shannon introduced entropy for discrete random variables in his foundational work on information theory, it found striking applications to ergodic theory in work of Kolmogorov and Sinai. Many variants and other applications have appeared in pure mathematics since, connecting probability, combinatorics, dynamics and other areas.

I will survey a few recent developments in this story. I will focus largely on (i) Lewis Bowen's "sofic entropy", which helps us to study the dynamics of "large" groups such as free groups, and (ii) a cousin of sofic entropy in the world of unitary representations, which leads to new connections with certain random matrix models.