



Mathematics & Statistics Colloquium

When: Wednesday, October 8, 2:00 pm - 2:50 pm

Where: Lee Drain Building 401

Entropy inside out

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In the late 1950s Kolmogorov introduced the concept of entropy into ergodic theory, and since that time entropy has become a pervasive presence in the theory of dynamical systems with applications to various areas including Riemannian geometry, analytic number theory, and Diophantine approximation. Kolmogorov's approach is based on Shannon's theory of information from the 1940s and is most generally applicable to actions of groups satisfying a kind of internal finite approximation property called amenability.

In the last few years a new approach to entropy in dynamics was pioneered by Lewis Bowen and further developed by Hanfeng Li and myself. Here one externalizes the finite approximation of the dynamics so that it occurs outside the acting group, and then counts these models in the spirit of Boltzmann's work in statistical mechanics. This notion of entropy applies to the much larger class of acting groups satisfying the property of soficity, which includes free groups. In fact it is not known whether non-sofic groups exist.

I will discuss all of these developments, and describe how the passage from single transformations to actions of general amenable and sofic groups marks a shift in applications away from geometry and smooth dynamics and more towards noncommutative harmonic analysis and operator algebras.