THE UNIVERSITY OF CHICAGO

Departments of Statistics and Mathematics
BILLINGSLEY LECTURES ON PROBABILITY

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"Voronoi Tessellations without Nuclei"

THURSDAY, May 18, 2023, at 4:30 PM
Math/Stat 112, 5727 S. University Avenue

Reception following the seminar at 5:30 PM, in the Reading Room, Math/Stat 101
5727 South University Avenue

ABSTRACT

Given a discrete set of points in a metric space, called nuclei, one associates to each such nucleus its Voronoi cell, which consists of all points closer to it than to other nuclei. This construction is widely used in mathematics, science, and engineering; it is even used in baking. In Euclidean space, one commonly uses a homogeneous Poisson point process to assign the locations of the nuclei. As the intensity of the point process tends to 0, the nuclei spread out and disappear in the limit, with each pair of points eventually belonging to the same cell. Surprisingly, this does not happen in other settings such as hyperbolic space; instead, one obtains a Voronoi tessellation without nuclei! We describe properties of such a limiting tessellation, as well as analogous behavior on Cayley graphs of finitely generated groups. We will illustrate results with many pictures and several animations. The talk is based on work of Sandeep Bhupatiraju and joint work in progress with Matteo d'Achille, Nicolas Curien, Nathanael Enriquez, and Meltem Unel. We will not assume knowledge of Poisson point processes or of hyperbolic space.