



KENNESAW STATE
UNIVERSITY
COLLEGE OF SCIENCE AND MATHEMATICS
Department of Mathematics

Discrete Mathematics Seminar¹

Friday, April 16, 2021
2:30–3:30pm (Microsoft Teams)

Title: *Sharing Pizza in n dimensions*

Speaker: Dr. Richard Ehrenborg, Professor, Department of
Mathematics, University of Kentucky

ABSTRACT: We introduce and prove the n -dimensional Pizza Theorem. Let \mathcal{H} be a real n -dimensional hyperplane arrangement. If K is a convex set of finite volume, the *pizza quantity* of K is the alternating sum of the volumes of the regions obtained by intersecting K with the arrangement \mathcal{H} . We prove that if \mathcal{H} is a Coxeter arrangement different from A_1^n such that the group of isometries W generated by the reflections in the hyperplanes of \mathcal{H} contains the negative of the identity map, and if K is a translate of a convex set that is stable under W and contains the origin, then the pizza quantity of K is equal to zero. Our main tool is an induction formula for the pizza quantity involving a subarrangement of the restricted arrangement on hyperplanes of \mathcal{H} that we call the *even restricted arrangement*. We get stronger results in the case of balls. We prove that the pizza quantity of a ball containing the origin vanishes for a Coxeter arrangement \mathcal{H} with $|\mathcal{H}| - n$ an even positive integer.

This is joint work with Sophie Morel and Margaret Readdy.

¹The Discrete Mathematics Seminar (DMS) is intended for Kennesaw State faculty working in the various areas of algebra, number theory, and discrete mathematics to get together to discuss their current work or related questions. Seminars often involve advanced mathematical knowledge. However, the seminars are open to anyone who is interested in attending.