

Mathematics Department Colloquium

Organizer: John Strain

Thursday, 4:10–5:00pm, 60 Evans

Oct. 5 **Herbert Edelsbrunner** , Arts and Sciences Professor of Computer Science and Mathematics, Duke University
Global methods for high-dimensional datasets

Considering the problem of learning about the structure of large and possibly high-dimensional datasets, we take a global approach aimed at determining their gross topology. Specifically, we introduce a parametrized family of witness complexes modeling the data and methods to extract the persistent topology from the family. We explain this construction in two steps, first introducing Čech, Rips, Alpha, and almost Alpha complexes for modeling the datasets. The extension to witness complexes rests on the Weak Delaunay Theorem by de Silva, which we generalize from Delaunay to almost Alpha complexes. Building on these ideas, we propose the family of alpha-beta witness complexes as a general global method to study datasets.