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Texas State Topology Seminar

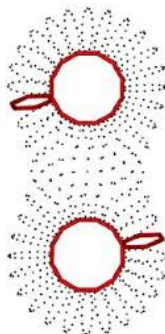Thursday, 2018, November 15, 2:00-3:15 p.m.*, in DERR 227

Speaker: Henry Adams (Colorado State University)

Topic: *Metric reconstruction via optimal transport*

ABSTRACT

Given a sampling of points X from a manifold, what information can one recover about the manifold? A useful tool is the Vietoris-Rips simplicial complex of a metric space X, which has as its simplices the finite subsets of X of diameter less than some fixed scale. If X is a sufficiently dense sample from a manifold, then the Vietoris-Rips complex of X (at small scales) recovers the manifold's topology. For this reason, Vietoris-Rips complexes are commonly used in applications of topology to data analysis. Nevertheless, many questions at larger scales remain open. We describe how the Vietoris-Rips complexes of the circle obtain the homotopy types of the circle, the 3-sphere, the 5-sphere, the 7-sphere, ..., as the scale increases. Furthermore, we argue that infinite Vietoris-Rips complexes should be equipped with a different topology: an optimal transport metric that thickens the metric on X.