1146-60-459 **Sayan Mukherjee*** (sayan@stat.duke.edu). *How Many Directions Determine a Shape and other Sufficiency Results for Two Topological Transforms.*

In this paper we consider two topological transforms based on Euler calculus: the persistent homology transform (PHT) and the Euler characteristic transform (ECT). Both of these transforms are of interest for their mathematical properties as well as their applications to science and engineering, because they provide a way of summarizing shapes in a topological, yet quantitative, way. Both transforms take a shape, viewed as a tame subset M of R^d, and associates to each direction v in S^{d-1} a shape summary obtained by scanning M in the direction v. These shape summaries are either persistence diagrams or piecewise constant integer valued functions called Euler curves. By using an inversion theorem of Schapira, we show that both transforms are injective on the space of shapes—each shape has a unique transform. By making use of a stratified space structure on the sphere, induced by hyperplane divisions, we prove additional uniqueness results in terms of distributions on the space of Euler curves. Finally, our main result provides the first (to our knowledge) finite bound required to specify any shape in certain uncountable families of shapes, bounded below by curvature. (Received January 28, 2019)