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**Paul Louis Bendich\*** (bendich@math.duke.edu), **Bei Wang** and **Sayan Mukherjee**. *Towards Stratification Learning via Homology Inference*.

A topological approach to stratification learning is developed for point cloud data drawn from a stratified space. We define a multi-scale notion of a stratified space, giving a stratification for each radius level, and we define a related notion of multi-scale (persistent) local homology. We then use methods derived from kernel and cokernel persistent homology to cluster the data points into different strata, and we prove a result which guarantees the correctness of our clustering, given certain topological conditions. Our correctness result is then given a probabilistic flavor: we give bounds on the minimum number of sample points required to infer, with probability, which points belong to the same strata. Finally, we give an explicit algorithm for the clustering, prove its correctness, and apply it to some simulated data. (Received February 14, 2013)