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**Vin de Silva\*** ([vin.desilva@pomona.edu](mailto:vin.desilva@pomona.edu)), Department of Mathematics, Pomona College, 610 N College Ave, Claremont, CA 91711-4411. *Topological dimensionality reduction.*

Nonlinear dimensionality reduction (NLDR) methods are widely used in machine learning. Algorithms such as Isomap (Tenenbaum et al), LLE (Roweis & Saul), and Laplacian Eigenmaps (Belkin & Niyogi) provide effective ways of representing a high-dimensional data set in terms of a small number of real-valued coordinate functions. I will discuss a recent variation of this paradigm, in which we seek coordinate functions taking values in the circle (rather than the real line). We use persistent topology and some elementary harmonic analysis to construct smooth, robust circle-valued functions. These methods give new tools for studying experimental or simulated data from periodic and quasiperiodic dynamical systems. This is joint work with Dmitry Morozov, Primoz Skraba, and Mikael Vejdemo-Johansson. (Received September 02, 2011)