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Moo K Chung* (mkchung@wisc.edu), 2015 Canterbury Road, Madison, WI 53711. *Constructing large-scale brain networks with billions of connections via persistent homology*. Preliminary report.

L1-penalty based sparse systems are usually parameterized by a tuning parameter that determines the sparsity of the system. How to choose the right tuning parameter is a fundamental and difficult problem in learning the sparse system. In this talk, by treating the tuning parameter as another dimension, persistent homological structures over the parameter space can be constructed. The method is applied in building large-scale network obtained from functional magnetic images of the human brain. By taking every voxel in images as network nodes, we can build the brain network with billions of connections. The constructed large-scale network is used to address the scientific question of if our thought pattern is heritable. This is a joint work with Paul Rathouz of University of Wisconsin-Madison, Benjamin Lahey of University of Chicago and David Zald of Vanderbilt University. The talk is based on arXiv:1509.04771. (Received July 01, 2016)