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Katherine Morrison* (katherine.morrison@unco.edu), University of Northern Colorado, Ross Hall 2239/ CB 122, 501 20th St, Greeley, CO 80639. *Properties of Neural Codes via the Neural Ring.*

The brain represents stimuli via patterns of neural activity. These activity patterns can be described by a neural code, i.e. a collection of indicator vectors showing which neurons co-fire in response to various stimuli. Neuroscientists seek to understand how the brain determines properties of the underlying stimulus space without access to the encoding map. It is believed that the brain can infer many properties of the stimulus space purely from the intrinsic structure of the neural code. We focus on convex receptive field codes, which have encoding maps that have been observed experimentally. In these codes, each neuron corresponds to a convex region of the stimulus space and the neuron fires when the stimulus falls within that region. Based solely on the intrinsic structure of the neural code, we wish to understand whether the code is a convex receptive field code and if so, to determine the minimal dimension of the underlying stimulus space that gave rise to the code. In this talk, we will show how the neural ring, an algebraic object that captures the full combinatorial data of the code, can be used to address these questions. This is joint work with several authors from an AMS Mathematics Research Community. (Received September 15, 2014)