1165-13-273 **Nora Youngs*** (nora.youngs@colby.edu), **Elizabeth Gross** and **Nida Obatake**. *Algebraic methods for analyzing neural codes.*

One major problem in neuroscience is to understand how the brain uses neural activity to form representations of the external world. It is known that combinatorial information in the firing patterns of neurons often reflects important features of the space of stimuli which generated them. How can we efficiently extract such information? In this work, we look at the problem of algorithmically drawing Euler diagrams representing the stimulus space of neural codes using two polynomial ideals: the neural ideal, a pseudomonomial ideal; and the neural toric ideal, a binomial ideal. In particular, we study how these objects are related to the theory of piercings in information visualization, and we show how minimal generating sets of the ideals reveal whether or not a code is 0, 1, or 2-inductively pierced. (Received January 19, 2021)