1146-92-313　　　　　**Alexander Ruys de Perez\*** (`alperez@math.tamu.edu`), **Anne Shiu** and **Laura Matusevich**.
*Max Intersection Complete Codes and the Order Complex.* Preliminary report.

A place cell is a neuron corresponding to a subset of Euclidean space known as a place field, that will fire if and only if the individual to which the neuron belongs is within that place field. The firing patterns of a collection of $n$ place fields can be represented by a neural code $C$ on $n$ neurons, which is a subset of $2^n$. Determining whether $C$ is convex, meaning that there is an arrangement of convex place fields for which $C$ is the code, remains an open problem.

A sufficient condition for convexity is being max intersection complete: any intersection of maximal codewords is also a codeword. Currently, the only way to determine this property is to evaluate all such intersections. We present a new method to determine max intersection completeness by introducing a simplicial complex for a code $C$ called the order complex $\Delta_{\mathcal{O}}(C)$ of $C$. We show how to construct $\Delta_{\mathcal{O}}(C)$ using Stanley-Reisner theory, describe how $\Delta_{\mathcal{O}}(C)$ encodes information about $C$, and give an algorithm to check whether $C$ is max intersection complete using the order complex of a closely related code. (Received January 25, 2019)