

MS1-2: Combinatorial Geometry of Threshold-Linear Networks

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Threshold-Linear Networks (TLNs) are a class of non-linear dynamical system that has been used to model the relationship between network topology and emergent dynamics in the brain. In this talk we will see how one can associate a hyperplane arrangement to any TLN and how the combinatorial properties of this arrangement can be encoded in an oriented matroid. This oriented matroid carries information about both fixed points and network topology and the connection between them is then captured by the Grassmann-Plucker relations. In this way, we prove the existence of invariant motifs, special network structures that carry information about dynamics that is invariant with respect to the synaptic weights of the network.