

# *Graduate Seminar*

*Professor David Pike,  
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*Thursday, January 24, 2019  
1 - 2 pm in HH-3017*

## *Connectivity in Hypergraphs*

**Abstract:**

We consider two natural notions of connectivity for hypergraphs: weak and strong. The strong deletion of a vertex  $v$  entails removing  $v$  from the vertex set of the hypergraph as well as removing from the edge set every edge that contains  $v$ . In contrast, the weak deletion of a vertex  $v$  merely entails removing  $v$  from each edge that contains  $v$ , as well as removing  $v$  from the vertex set of the hypergraph. Define  $\kappa_S(H)$  (resp.  $\kappa_W(H)$ ) to be the least number of vertices whose strong (resp. weak) deletion from a hypergraph  $H$  results in a disconnected hypergraph. Additionally, define  $\kappa'_W(H)$  to be the least number of edges whose removal from the edge set of  $H$  results in a disconnected hypergraph.

We generalise a result of Whitney about connectivity of graphs and prove that  $\kappa_S(H) \leq \kappa'_W(H) \leq \delta(H)$  for any nontrivial hypergraph  $H$ . We also show that determining a minimum strong vertex cut is NP-hard for general hypergraphs, and, moreover, this problem remains NP-hard when restricted to hypergraphs with maximum edge size at most 3.

This is joint work with Megan Dewar and John Proos.