1152-57-396 **Dan Guralnik***, guraldan@seas.upenn.edu, and **Robert Ghrist**. *Ghrist-Peterson configuration spaces, cubings and Boolean queries.*

Motivated by navigation and control problems in robotics, Ghrist and Peterson introduced a class of non-positively curved (NPC) cubical complexes arising as configuration spaces of reconfigurable systems, best seen as discretized state space representations of machines such as a multi-jointed robotic arm.

In applications, such agents need to contend with *a-priori* unknown obstacles to navigation. Nevertheless, the configuration spaces remain NPC as obstacles are added. This motivates the following problem: *Given a finite NPC cubical complex $X$ and a point-separating collection $S$ of Boolean queries on $X^0$, find an efficient algorithm for learning $X$ from the outputs provided by $S$ along an appropriately chosen path in $X$.*

In this talk, we begin tackling the problem of identifying $X$ when it is CAT(0)—a cubing. We show that the set of hyperplanes of $X$ is the unique solution of a submodular minmax problem over the space of point-separating systems of Boolean queries on $X^0$, which can be stated in terms of the graph laplacian of $X^1$. We will finish with an overview of our approach to the more general learning problem stated above. (Received September 09, 2019)