

# Categories of Graphs and Contractions

Eric Ramos

University of Oregon

## Abstract

For a (connected, finite) graph  $G$ , we define its genus to be the quantity  $g := E - V + 1$ , where  $E$  is the number of edges of  $G$  and  $V$  is the number of vertices. While it is not the case that graph homomorphisms preserve this invariant, it is the case that contractions between graphs do. In this talk we will consider the category of all genus  $g$  graphs and contractions. More specifically, we consider integral representations of the opposite category, i.e. functors from the opposite category to Abelian groups. Using the combinatorics of graph minors, we will show that representations of this kind satisfy a Noetherian property. As applications of this technical result, we show that configuration spaces of graphs as well as KazhdanLusztig polynomials of graphical matroids must satisfy certain strong finiteness conditions. This is joint work with Nick Proudfoot.