JOEL FRIEDMAN, University of British Columbia

Sheaves on Graphs and Applications

We will give an introduction to sheaves on graphs and briefly discuss some of their applications.

A sheaf of vector spaces on a graph is a family of vector spaces, one for each vertex and one for each edge, with maps from each edge's space to those of its incident vertices. Each sheaf has its own incidence matrix, Laplacians, adjecency matrices, etc.

Sheaves allow us to (1) compare different sheaves over the same graph via exact sequences, and (2) create "new" morphisms between graphs, e.g., when there is no surjection of one graph to another, there can be surjections of the sheaves "representing" the graphs.

We explain how the above ideas helped to resolve the Hanna Neumann conjecture, using a symmetry argument for sheaves on Cayley graphs. This symmetry argument was recently "algebrized" by Jaikin-Zapirain, via work of Dicks, to resolve the "pro-p analog" of the Hanna Neumann conjecture.

This talk assumes only basic linear algebra and graph theory. Part of the material is joint work with Alice Izsak, Lior Silberman, and Warren Dicks.