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Amanda I Beecher* (am2875@albany.edu). *Combinatorial topology of matroids and free resolutions of multigraded modules.*

Diana Taylor constructs a free resolution for every monomial ideal using the topological chain complex of a simplicial complex associated to the monomial ideal. Both the maps and the free modules are described using these combinatorial and topological tools. Alexandre Tchernev generalizes Taylor's construction and describes a free resolution for all multigraded modules. However, this description uses the linear algebra of a presentation of the multigraded module and not the topology of a combinatorial object associated to it.

We show that the free modules in the free resolution of Tchernev are given by the homology of certain simplicial complexes determined by a matroid associated to a presentation of the module. The techniques used will be completely combinatorial and do not rely on the linear algebra structure. We will also give evidence to suggest that this matroid will also determine the maps in a free resolution of a multigraded module. (Received January 02, 2007)