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**Ezra Miller\*** (ezra@math.duke.edu), **Isabella Novik** and **Ed Swartz**. *Face rings of simplicial complexes with singularities.*

The face ring of a simplicial complex modulo  $m$  generic linear forms is shown to have finite local cohomology if and only if the link of every face of dimension  $m$  or more is *nonsingular*, i.e., has the homology of a wedge of spheres of the expected dimension. This is derived from an enumerative result for local cohomology of face rings modulo generic linear forms, as compared with local cohomology of the face ring itself. The enumerative result is generalized to squarefree modules. A concept of *Cohen–Macaulay in codimension  $c$*  is defined and characterized for arbitrary finitely generated modules and coherent sheaves. For the face ring of an  $r$ -dimensional complex  $\Delta$ , it is equivalent to nonsingularity of  $\Delta$  in dimension  $r - c$ ; for a coherent sheaf on projective space, this condition is shown to be equivalent to the same condition on any single generic hyperplane section. The characterization of nonsingularity in dimension  $m$  via finite local cohomology thus generalizes from face rings to arbitrary graded modules. (Received April 12, 2010)