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Homology of Cycle Matroids of Complete Graphs

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The independence complex of a matroid is a simplicial complex whose i-dimensional simplices are the rank i+1 independent sets of the matroid. One of the most important properties of this complex is that it is shellable. As a consequence the rank of the reduced homology of this complex is nonzero only in the top dimension.

The top dimension in general is described in terms of the internal activities of bases of a matroid with a fixed ordering of the ground set elements. In this talk I consider the independence complex of the cycle matroid of a complete graph. I will present a very elegant combinatorial description and a generating function of the top homology rank of these complexes based only on the general definition of reduced Euler characteristic without any reference to the internal activities of bases.