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Title: ***The Dehn-Somerville relations and the Catalan matroid***

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ABSTRACT: The f-vector of a d-dimensional polytope P stores the number of faces of each dimension. When P is simplicial, Dehn (in 1905) and Sommerville (in 1927) constructed a linear transformation that condenses the f-vector into the g-vector, which has length [d=2]. Thus, to determine the f-vector of P, we only need to know half of its entries. This raises the question: Which [d=2]-subsets of the f-vector of a general simplicial polytope are sufficient to determine the whole f-vector? We prove that these subsets are given by the bases of the Catalan matroid.

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