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Kai Fong Ernest Chong* (kc343@cornell.edu), Department of Mathematics, 310 Malott Hall, Cornell University, Ithaca, NY 14850. *Macaulay-Lex Rings and the Hilbert Functions of Colored Quotient Rings.*

In 1927, Macaulay characterized the Hilbert functions of graded ideals of polynomial rings in terms of lexicographic ideals. Motivated by Macaulay's theorem, Mermin and Peeva asked if there is an analogous characterization of the Hilbert functions of graded ideals in quotients of polynomial rings, thereby introducing the notion of Macaulay-Lex rings. In this talk, I will define Macaulay-Lex rings and discuss the rich interplay between such rings and various generalizations of a well-known result in combinatorics known as the Kruskal-Katona theorem. I will introduce the notion of colored quotient rings, explain its combinatorial significance, and give a complete characterization of all Macaulay-Lex colored quotient rings. I will also explain how this characterization is a simultaneous generalization of not only Macaulay's theorem and the Kruskal-Katona theorem, but also of several extensions of these two theorems. (Received January 16, 2015)