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Chromatic symmetric functions and e-positivity

Richard Stanley introduced the chromatic symmetric function X_G of a simple graph G, which is the sum of all possible proper colorings with colors $\{1, 2, 3, \dots\}$ coded as monomials in commuting variables. These formal power series are symmetric functions and generalize the chromatic polynomial. Soojin Cho and Stephanie van Willigenburg found that, given a sequence of connected graphs $G_1, G_2, \dots$ where G_i has i vertices, $\{X_{G_i}\}$ forms a basis for the algebra of symmetric functions. This provides a multitude of new bases since they also discovered that only the sequence of complete graphs provides a basis that is equivalent to a classical basis, namely the elementary symmetric functions. This talk will discuss new results on chromatic symmetric functions using these new and old bases, and additionally we will also resolve Stanley's e-Positivity of Claw-Contractible-Free Graphs. This is joint work with Angele Foley and Stephanie van Willigenburg.