Determinants - A Condensed Matter

Dodgson’s condensation method for computing determinants has led to the notion of alternating sign matrices and to their remarkable combinatorics. These topics have connections with the 6-vertex model in physics and statistical mechanics and with much recent work on graphical condensation, group characters, and a whole lot more.

Bases, Braids, and Beyond

Chevalley’s basis for simple Lie algebras has been the preferred basis choice for over a century, and it has given much insight into the structure and representations of the Lie algebra. This talk will focus on the smallest simple Lie algebra, $sl(2)$, of $2 \times 2$ matrices of trace zero, and a different choice of basis for it that makes transparent connections with the modular group, the braid group on 3 strands and its representations, and the great beyond. This basis arose in a natural way from combinatorial investigations of association schemes and tridiagonal pairs of linear transformations.