Rob Wilson: *Involution centralizers in matrix group algorithms*

An involution is an element t of order 2, so $t^2 = 1$, and its centralizer is the subgroup consisting of elements g which commute with it, thus $gt = tg$. In abstract group theory, involution centralizers play a central role in the study of finite simple groups. In computational group theory until recently they have been little used. However, in large classes of examples they are easy to construct, and many problems in G can be reduced to equivalent problems in involution centralizers, which are typically much smaller than G. One example is membership testing: given invertible matrices $x, g_1, \ldots, g_k$, is x in the group generated by $g_1, \ldots, g_k$? Ryba's algorithm reduces this problem to three instances of the same problem in smaller groups. Another example is the p-core problem: deciding whether a group given by generators has a non-trivial normal p-subgroup. A method due to Chris Parker and myself reduces this also to involution centralizers.