**Title:** Springer correspondences for dihedral groups

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**Abstract:** Let $G$ be a reductive algebraic group, and let $W$ be its Weyl group. (For example, if $G = GL(n)$, then $W$ is the symmetric group $S_n$.) A recurring theme in representation theory is the fact that many deep ideas and sophisticated structures attached to $G$ are accessible via fairly elementary calculations in terms of $W$. Weyl groups themselves are fairly well-understood—they are all crystallographic finite Coxeter groups, which have been studied since at least the 1930's—so this means we can really "get our hands on" abstract things like perverse sheaves on the unipotent variety of $G$.

Now, suppose we start with a group $W$ that's not a Weyl group of anything, but is close: perhaps a non-crystallographic Coxeter group, or even a complex reflection group. Many representation-theoretic calculations still make sense, and the results have some shocking properties (various compatibility, integrality, and positivity conditions that are all explained by $G$ in the Weyl group case). It looks as though we're studying the representation theory and geometry of "nonexistent" algebraic groups! I will discuss various results in this vein, in particular for the case where $W$ is a dihedral group. This is joint work with A.-M. Aubert.