Kazhdan-Lusztig theory for disconnected groups

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Suppose G is a real reductive Lie group with Cartan involution θ, so that $K = G^\theta$ is a maximal compact subgroup. I'll explain how to use θ to construct an extension group

$$1 \to G \to {}^\delta G \to \{1, \delta\} \to 1$$

Clifford theory provides an easy parametrization of the irreducible representations of ${}^\delta G$ in terms of those of G; but describing the irreducible characters of ${}^\delta G$ is not quite so easy. I'll describe work with Lusztig solving that problem, using an appropriate generalization of Kazhdan-Lusztig polynomials.

Finally I'll explain work with Adams, van Leeuwen, Trapa, and Yee which uses the character theory of ${}^\delta G$ to describe invariant Hermitian forms on representations of G.