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On the Cohomology of Deligne-Lusztig Varieties

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In this paper, we present a conjecture on the degree of unipotent characters in the cohomology of particular Deligne-Lusztig varieties for groups of Lie type, and derive consequences of it. These degrees are a necessary piece of data in the geometric version of Brou\'e's abelian defect group conjecture, and can be used to verify this geometric conjecture in new cases. The geometric version of Brou\'e's conjecture should produce a more combinatorially defined derived equivalence, called a perverse equivalence. We prove that our conjectural degree is an integer (which is not obvious) and has the correct parity for a perfect isometry, and verify that it induces a perverse equivalence for all unipotent blocks of groups of Lie type with cyclic defect groups, whenever the shape of the Brauer tree is known (i.e., not E7 and E8). It has also been used to find perverse equivalences for some non-cyclic cases. This paper is a contribution to the conjectural description of the exact form of a derived equivalence proving Brou\'e's conjecture for groups of Lie type.

Comments:	This paper has now been superseded by arXiv:1207.0116: Pervese equivalences and Brou\'e's conjecture II: The cyclic case, and that article should be referenced for the results in this paper
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Which authors of this paper are endorsers?