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Gluing representations via idempotent modules and constructing endotrivial modules.

Suppose that G is a finite group and k is a field of characteristic $p > 0$. The endotrivial kG -modules are the elements of the Picard group of invertible objects in the stable category of kG -modules. They form an important subgroup of the group of all self equivalences of the stable category. In addition, endotrivial modules play a significant role in the block theory and modular representation theory of G . In this paper we investigate a new construction of endotrivial modules, which is not limited to p -groups. We analyse the new method by comparing it to one of the two constructions of Carlson. We show that the “cohomological pushout” method is a “gluing” in the sense of developments of Balmer and Favi. Geometrically, the “gluing” construction can be interpreted as taking the patching data for an invertible sheaf over the variety associated to the cohomology ring $H^*(G, k)$ and translating these data into patching data for infinite dimensional Rickard idempotent modules. The results are finite dimensional endotrivial modules. (Received January 04, 2007)