

Graded Category $\mathcal{O}$ and Motivic Six Operations

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August 23, 2016

Following the work of Harish-Chandra, Bernstein–Gelfand–Gelfand et al., many questions in the representation theory of a complex semisimple Lie group can be attacked by purely algebraic means, using the the BGG category $\mathcal{O}$ associated to its Lie algebra.

By the work of Beilinson, Ginzburg, Soergel and Wendt, categories of certain *mixed* étale sheaves, *mixed* Hodge modules or *motives* on a corresponding flag variety provide *graded versions* of the derived category $\mathcal{O}$. We will see in the example of parabolic induction how the motivic six operations can be used to construct graded versions of important functors for category $\mathcal{O}$.

If time permits, we will talk about a purely geometric construction of the derived graded *modular* category $\mathcal{O}$ in terms certain motives on the flag variety (this is joint work with Shane Kelly).