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Geometric Eisenstein series: twisted setting. (English) Zbl 1387.11082

The author generalizes the quantum geometric Langlands correspondence (for roots of unity) from the case of split torus. It geometrizes a conjectural extension of the Langlands program to metaplectic groups proposed by Weissman. Let $k$ be an algebraically closed field, $G$ a simple connected group, $X$ a smooth projective curve over $k$, and $\text{Bun}_G$ the stack of $G$-torsors on $X$. For some $n \geq 1$ let $N = 2h^n$, where $h$ is the dual Coxeter number for $G$, and introduce a $\mu_N$-gerb $\text{Bun}_G \to \text{Bun}_M$ that comes from the canonical Brylinski-Deligne extension of $G$ by $K_2$. For the parabolic subgroup $P \subset G$ and its Levi factor $M$ one similarly introduces $\text{Bun}_P$ and $\text{Bun}_M$. For an injective character $\zeta : \mu_N(k) \to \overline{\mathbb{Q}}_l^*$ the author considers the derived category of étale $\mathbb{Q}_l$-sheaves on which $\mu_N(k)$ acts by $\zeta$. The Eisenstein series is defined as a functor $\text{Eis} : D_c(\text{Bun}_P) \to \text{Bun}_M$ using a twisted version of $\text{Bun}_P$ intersection homology sheaf $\text{IC}_\zeta$, and the author proves that $\text{Eis}$ commutes with the Hecke functors with respect to the dual embedding, and that the formation of $\text{Eis}$ is transitive for the diagram $T \subset M \subset G$, where $T$ is a maximal torus.

For $G = \text{SL}_2$ a partial description of the Fourier coefficients of $\text{Eis}$ in terms of a known sheaf is given, which relates them to quantum groups. As an application, the author derives a formula for the first Whittaker coefficient of the metaplectic extension of $\text{SL}_2$, which turns out to be an $l$-adic analog of the space of conformal blocks of the Wess-Zumino-Witten model, and can be seen as a generalization of the central value of an abelian $L$ function. In the case of $X = \mathbb{P}^1$ new automorphic sheaves (“theta-sheaves”) are constructed and their Hecke property is proved.

Reviewer: Sergiy Koshkin (Houston)

MSC:

11R39 Langlands-Weil conjectures, nonabelian class field theory
11G45 Geometric class field theory
14H60 Vector bundles on curves and their moduli

Keywords:
geometric Langlands correspondence; derived category of étale sheaves; Eisenstein series; intersection homology sheaf; Hecke functors; Wess-Zumino-Witten model; central value of an abelian $L$ function; theta-sheaves

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References:


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