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*Motivic Integration and local integrability of characters*

Let  $K$  be a local field,  $G$  a reductive group over  $K$ , and  $\pi$  a representation of  $G$ . A theorem due to Harish-Chandra asserts that there is a locally constant function defined on the set of regular elements in  $G$ , which is also locally in  $L^1$ , that represents the distribution character of  $\pi$ . This function is commonly referred to as the character of  $\pi$ . Harish-Chandra's theorem assumes that  $K$  has characteristic zero. In positive characteristic, it is known that the character function exists and is locally constant, but it is not known whether it is locally integrable. We show that for a large class of representations of symplectic and special orthogonal groups, the character is in a class of functions called "constructible motivic exponential functions"; this class is defined by means of logic.

As an application, for these representations we can conclude that the character is a locally  $L^1$  even if  $K$  is of positive characteristic, as long as the residue characteristic is large.

This is joint work with Raf Cluckers, Clifton Cunningham, and Loren Spice.