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Revisiting the Local Langlands Correspondence for $GL(n, F)$, n a prime

The study of the Local Langlands Correspondence for $GL(n, F)$, where F is a local field, was initiated by Jacquet–Langlands in 1970; many people have contributed since their work, and the proof has been completed by Henniart and Harris/Taylor. In the tame case, supercuspidal representations correspond to characters of elliptic tori satisfying certain regularity type conditions, but the local Langlands correspondence is unnatural because it involves a twist by some finite order character of the torus. Taking the cue from the theory of real groups, supercuspidal representations should instead be parameterized by characters of covers of tori. Stephen DeBacker has calculated the distribution characters of supercuspidal representations for $GL(n, F)$, n a prime, and they are written in terms of functions on elliptic tori in $GL(n, F)$.

Over the reals, Harish-Chandra parameterized discrete series representations of real groups by giving their distribution characters. Those distribution characters are written in terms of functions on covers of real tori. I have succeeded in showing that if one writes down a natural analogue of Harish-Chandra’s distribution character for p -adic groups, it is the character of a unique supercuspidal representation of $GL(n, F)$, where n is prime, away from where the local character expansion is needed.

These results pave the way for a new statement of the local Langlands correspondence for $GL(n, F)$, where n is prime. In particular, there is no need to introduce any character twists that occur in the already existing description of the local Langlands correspondence for $GL(n, F)$.