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K-types of local Weil representations

Let F be a nonarchimedian local field with ring of integers R, maximal ideal P, and residue field k of odd characteristic. Let W be the Weil representation of the symplectic group $Sp(2n, F)$, corresponding to a character χ of the additive group of F. Suppose that the conductor of χ is the fractional ideal P^ℓ. If ℓ is even, the restriction of W to the maximal compact subgroup $\mathrm{Sp}(2n, R)$ is known to be a direct sum $\bigoplus_{m=0}^{\infty} T_m$, where each T_m is can be regarded as a representation of $\mathrm{Sp}(2n, R/P^{2m})$; this uses the lattice model of the Schrödinger representation of the Heisenberg group. We show that there is an analogous decomposition in the case that ℓ is odd. Each T_m arises as a direct summand of a Weil-like representation of $\mathrm{Sp}(2n, R/P^{2m+1})$. In particular, T_0 is the Weil representation of $Sp(2n, k)$.

This is joint work with David McNeilly.