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Toral supercuspidal representations and Shintani lifting

Given a tame elliptic regular pair $(S(F), \phi)$ of a p -adic group $G(F)$, one can produce a representation of $G(F)$ in two different ways: (twisted) Yu's construction and positive-depth Deligne–Lusztig induction. It is natural to ask when these produce the same representation. In 2023, Chan and Oi proved that if the residue field is sufficiently large, positive-depth Deligne–Lusztig induction and twisted Yu's construction coincide.

In this talk, we will discuss how to extend this result to small residue fields using Shintani lifting of the associated parahoric representations. This gives us a correspondence between these representations of $G(F)$ and those of $G(F')$ coming from the pair $(S(F'), \phi \circ \text{Nm}_{F'/F})$, where F'/F is a finite unramified extension.