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Lost in Levis: The Case of the Missing Middle

The Adler-Yu construction of supercuspidal representations posits, among other things, an exhaustive list of sequences of “twisted Levi subgroups”. In this talk we define these and give an explicit construction of their conjugacy classes in the group $SO(5)$, focusing particularly on elliptic tori, adapting methods by Lawrence Morris (1991); this parallels work by Ju-Lee Kim and JK Yu for $Sp(4)$. Surprisingly, not all elliptic tori allow intermediate twisted Levis in the sequence. Even stranger, some other elliptic tori not only allow, but actually require, an intermediate Levi. These issues are governed by the regularity and genericity of elements of the torus. Our results allow a completely explicit construction of all supercuspidal representations of $SO(5)$.