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Brick by Brick: Assembling Supercuspidal Representations of $SO(5)$.

The Adler–Yu construction of supercuspidal representations starts with sequences of twisted Levi subgroups. In this talk, we introduce the concept of twisted Levis and especially elliptic tori, and classify them up to conjugacy in $SO(5)$. Our approach implements methods developed by Lawrence Morris (1991). The next step is to identify so-called generic elements in the Lie algebra of the center of each twisted Levi subgroup, as we will be able to attach families of supercuspidal representations to these. Surprisingly, not every twisted Levi sequence gives rise to generic elements. Building on that, we now have all the right components: the twisted Levis, the generic elements, some points in the building and some cuspidal representations. It's like having every piece of a Lego set neatly laid out, along with the instruction manual—the Adler–Yu construction—that guides us step by step. With everything in place, the construction of supercuspidal representations for $SO(5)$ is no longer a mystery—it's just assembly.