April 29: Lucas Mason-Brown *Unipotent representations of real reductive groups.*

Let G be a real reductive group and let $\widehat{G}$ be the set of irreducible unitary representations of G. The determination of $\widehat{G}$ (for arbitrary G) is one of the fundamental unsolved problems in representation theory. In the early 1980s, Arthur introduced a finite set $\mathrm{Unip}(G)$ of (conjecturally unitary) irreducible representations of G called *unipotent representations.* In a certain sense, these representations form the building blocks of $\widehat{G}$. Hence, the determination of $\widehat{G}$ requires as a crucial ingredient the determination of $\mathrm{Unip}(G)$. In this thesis, we prove three results on unipotent representations. First, we study unipotent representations by restriction to $K \subset G$, a maximal compact subgroup. We deduce a formula for this restriction in a wide range of cases, proving (in these cases) a long-standing conjecture of Vogan. Next, we study the unipotent representations attached to induced nilpotent orbits. We find that $\mathrm{Unip}(G)$ is generated by an even smaller set $\mathrm{Unip}'(G)$ consisting of representations attached to rigid nilpotent orbits. Finally, we study the unipotent representations attached to the principal nilpotent orbit. We provide a complete classification of such representations, including a formula for their K-types.