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K-types for principal series representations of $\mathrm{GL}(3)$

Let $\mathfrak{o}$ be the ring of integers of a p-adic field F, then $K = \mathrm{GL}(3, \mathfrak{o})$ is a maximal compact subgroup of the p-adic group $G = \mathrm{GL}(3, F)$. On restriction to K, a principal series representation of G necessarily decomposes as the direct sum of smooth irreducible representations of K each appearing with finite multiplicity. We will give a description of this decomposition, with particular emphasis on the unramified case, and outline an application to an analogue of the Steinberg representation for the finite group $\mathrm{GL}(n, \mathfrak{o}/\mathfrak{p}^\ell)$ where $\mathfrak{p}$ is the prime ideal of $\mathfrak{o}$.

This is joint work with Monica Nevins (University of Ottawa).