Plancherel measure and reducibility of parabolic induction via types and covers

Phil Kutzko

Suppose that F is a p-adic field and that G is the group of F-points of a connected reductive group over F. (So, for example, G could be the general linear group $GL_N(F)$ or it could be a classical group such as $Sp_{2N}(F)$.) Then the representation theory of G has, via the ideas of R.P Langlands, a remarkable connection with the representation theory of the absolute Galois group, Γ_F of F. (So Γ_F is the galois group of $\overline{F}/F$ where $\overline{F}$ is an algebraic closure of F.) Perhaps even more remarkable is that this connection is coherent with a connection between the same objects over number fields and so yields the local input for such things as L-functions. This input takes the form of local L-functions and ϵ-factors and one way in which these factors arise in the representation theory of G is via certain density functions associated to the Plancherel measure of G, functions which also control the reducibility of certain representations induced from parabolic subgroups of G. Thus an efficient method to compute the Plancherel measure of the various components of the reduced dual, $\widehat{G}$, of G which arise either from Harish-Chandra's decomposition of $\widehat{G}$ via discrete series representations of Levi subgroups or Bernstein's decomposition of $\widehat{G}$ via supercuspidal representations of these subgroups will be of some interest, both intrinsically and in terms of its applications to local number theory. One such method is given by the theory of types and covers and it is the purpose of this course to give a self-contained, gentle, introduction to this theory and then to indicate how it may be used to compute Plancherel measure and reducibility of parabolically induced representations.