1022-22-4 **Arun Ram***, University of Wisconsin. *Space walks: Combinatorics, representations, spherical functions, and p-compact groups.*

This talk will be about walking around in compact Lie groups, in p-adic groups, in buildings, and in analogues of the upper half plane; with LOTS of pictures. The story is somewhat chronological. In the beginning of representation theory, Frobenius and Schur used partitions and 'Young tableaux' to analyze the representations of their favourite groups, the symmetric group and the general linear group. Hermann Weyl had a great insight and explained how to generalize the partitions to all compact Lie groups. In this case the combinatorics is controlled by the "Weyl group", a group generated by reflections that acts on an integral lattice. Generalising the Young tableaux to all compact Lie groups had to wait until 1994, when P. Littelmann introduced his 'path model' (which was, for him, a combinatorial way to write down the 'crystal' for the corresponding quantum group). A thorn in the side of many researchers has been the fact that there are plenty of groups generated by reflections that "look like" Weyl groups but don't seem to have any compact Lie group associated to them. Homotopy theory has produced (about 1995) the p-compact groups, and proved (about 2004) that they are absolutely the right generalisations of compact Lie groups (at least for this theory). They are constructed as (p-completed) classifying spaces of certain discrete groups. Amazingly, in the classical compact Lie groups case, the classifying space construction matches up with the 'path model' and so it turns out that we arrive at the same object from both the algebraic/combinatorial and the homotopy theory points of view! (Received July 12, 2005)