1061-55-2 **Alejandro Adem***, University of British Columbia, Department of Mathematics, Vancouver, BC.
*Homotopy theory and spaces of representations.*

In this talk we will discuss properties of spaces of homomorphisms $\mathrm{Hom}(Q, G)$ where $Q$ is a discrete group and $G$ a Lie group. The example given by the ordered commuting n-tuples in a compact Lie group will be discussed in some detail. We will also discuss how spaces of homomorphisms and the descending central series of the free groups, can be used to construct simplicial spaces for each integer $q > 1$ with realizations $B(q, G)$ that filter the classifying space $BG$. In particular for $q = 2$ this yields a single space $B(2, G)$ assembled from all the $n$-tuples of commuting elements in $G$. Homotopy properties of the $B(q, G)$ will be described for finite groups, and cohomology calculations provided for compact Lie groups. Results on understanding both the number and stable homotopy type of the components of related spaces of representations will also be discussed. This is joint work with F.Cohen, E.Torres and J.Gomez. (Received April 23, 2009)