1007-51-126 **Michael Kapovich*** (`kapovich@math.ucdavis.edu`), Department of mathematics, 1 Shields Ave., University of California, Davis, CA 95616. *Generalized triangle inequalities and their applications.*

This talk is a survey of my joint work with Bernhard Leeb and John Millson.

Everybody knows how to construct triangles with the prescribed side-lengths a_1, a_2, a_3 in the Euclidean plane: The necessary and sufficient conditions for this are the usual triangle inequalities $a_i \leq a_j + a_k$. I will explain how to solve (in a unified fashion) the analogous problem for other geometries X: Nonpositively curved symmetric spaces (and their infinitesimal analogues) and Euclidean buildings. The notion of "side-length" in this generality becomes more subtle: *Side-lengths* are vectors in the Weyl chamber Δ.

I then will discuss application of these results to several problems in the algebraic group theory including generalizations of the Weyl's and Thompson's problems on eigenvalues (resp. singular values) of sums (resp. products) of $n \times n$ matrices, and generalization of the saturation theorem of Knutson and Tao to Lie groups other that $SL(n)$. (Received February 15, 2005)