1050-52-84 **Daniel A Klain*** (daniel_klain@uml.edu), Department of Mathematical Sciences, University of Massachusetts Lowell, Lowell, MA 01854. *If you can hide behind it, can you hide inside it?*

Suppose that K and L are compact convex subsets of Euclidean space, and suppose that, for every direction u, the shadow (that is, the orthogonal projection) of K onto the subspace normal to u can be translated inside the corresponding shadow of the body L. Does this mean that the original body K can itself be translated into L? Can we even conclude that K has smaller volume than L?

Although these questions have easily demonstrated negative answers in dimension 2, the (possibly surprising) answer to these questions continues to be "No" in Euclidean space of any finite dimension.

In this talk I will describe concrete constructions for sets K and L in n-dimensional Euclidean space such that every (n-1)-dimensional shadow of K can be translated inside the corresponding shadow of L, while at the same time K has strictly greater volume than L.

It turns out, however, that the body L with larger (covering) shadows is guaranteed to have greater or equal volume than the set K provided that L is a cylinder, or, even more generally, provided that L can be approximated by Blaschke combinations of cylinders. This cylinder covering theorem will also be presented, along with some variations and related open questions regarding projections in convex geometry. (Received February 26, 2009)