

Geometry, Groups and Dynamics/GEAR Seminar  
(held at the Illinois hub of GEAR )

**12:00 pm, Tuesday, September 27, 2016, 243 Altgeld Hall**

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**Treating Limits as Colimits and Colimits as Limits ... with Applications!**

Abstract: Actually, in this talk, we will restrict ourselves to treating subspaces as quotient spaces and quotient spaces as subspaces ... with applications. To elaborate, consider a manifold. Typically it is defined to be a certain gluing of open subsets of Euclidean space (a quotient space), although we know we can embed any manifold into some large Euclidean space (a subspace). Conversely, the level set of a regular value of a smooth real-valued function (a subspace) is a manifold (a quotient space). This is all elementary, but when one starts treating singular spaces in this fashion, interesting math occurs! We will first focus on orbifolds, and review how this point-of-view leads to an essentially injective functor between orbifolds and differentiable (local) semi-algebraic varieties. As an application, we use this to prove that a symplectic reduced space of a Hamiltonian circle action is never diffeomorphic to an orbit space of a Lie group action, unless it is an orbifold. Moreover, it is only ever an orbifold if its dimension is at most 2, or if the reduction is performed at a regular value of the momentum map.

[Video](#)