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**Speaker:** Ruobing Zhang  
Princeton University

Thursday, September 24, 2015

2:00 PM

125 Hayes-Healy Hall

**Title:** Quantitative Nilpotent Structure and Regularity for Collapsed Einstein Manifolds

**Abstract:**

In this talk we discuss the regularity of Einstein manifolds and more generally manifolds with just bounded Ricci curvature, in the collapsed setting. A key tool in the regularity theory of noncollapsed Einstein manifolds is the following: If a bigger geodesic ball on an Einstein manifold  $M^n$  is sufficiently Gromov-Hausdorff-close to a ball in  $\mathbb{R}^n$ , then in fact the curvature on a smaller ball is uniformly bounded. No such results are known in the collapsed setting, and in fact it is easy to see without more such results are false. It turns out that the failure of such an estimate is related to topology. Our main theorem is that for the above setting in the collapsed context, there is a correspondence between the uniform curvature estimates and the local nilpotent rank. There are generalizations of this result to bounded Ricci curvature and even just lower Ricci curvature. This is a joint work with Aaron Naber.