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Michael Munn*, Dept of Mathematics, CUNY Graduate Center, 365 Fifth Avenue, New York, NY 10016, and **Christina Sormani**, Dept of Mathematics, CUNY Graduate Center, 365 Fifth Avenue, New York, NY 10016. *Applications of Geometric Inequalities to the topology of manifolds with nonnegative Ricci Curvature.*

I will survey old results and present open problems concerning complete noncompact Riemannian manifolds of nonnegative Ricci curvature. By the Bishop-Gromov volume comparison theorem, these manifolds are known to have at most Euclidean volume growth $\omega_n r^n$. Abresch-Gromoll proved that the diameter growth of these manifolds is at most linear. Schoen-Yau proved that in three dimensions if the Ricci curvature is strictly positive, then the manifold is diffeomorphic to Euclidean space. The topology of such manifolds with nonnegative Ricci curvature is still open and might be studied using Ricci flow.

We will then survey higher dimensional results of Yau, Anderson, Li, Sormani-Shen, Sormani, Perelman and Cheeger-Colding. We close with a result of my student, Michael Munn, which provides explicit constants, $C_{k,n}$ such that an n dimensional manifold with nonnegative Ricci curvature and volume growth greater than $C_{k,n}r^n$ has a trivial k^{th} homology. This result is proven by dissecting an earlier proof of Perelman that a sufficiently large constant exists to guarantee that the manifold is contractible. The methods involve a reverse Bishop-Gromov Lemma of Perelman's which proves the existence of a geodesic and the Abresch-Gromoll Excess Inequality. (Received January 17, 2008)