1047-53-37 **Michael Munn*** (mikemunn@gmail.com), 310 W14th St, Apt. 3C, New York, NY 10014. *Volume growth and the topology of manifolds with nonnegative Ricci curvature.*

Let M^n be a complete, open Riemannian manifold with $\mathrm{Ric} \geq 0$. In 1994, Grigori Perelman showed that there exists a constant $\delta_n > 0$, depending only on the dimension of the manifold, such that if the volume growth satisfies $\alpha_M := \lim_{r\to\infty} \frac{\mathrm{Vol}(B_p(r))}{\omega_n r^n} \geq 1 - \delta_n$, then M^n is contractible. Here we employ the techniques of Perelman to find specific lower bounds for the volume growth, $\alpha(k,n)$, depending only on k and n, which guarantee the individual k-homotopy group of M^n is trivial.

In addition, we extend these results to the setting of metric measure spaces Y which can be realized as the pointed metric measure limit of a sequence $\{(M_i^n, p_i)\}$ of complete, open connected Riemannian manifolds with $\mathrm{Ric}_{M_i} \geq 0$, provided the limit space Y satisfies the same lower bounds on volume growth, i.e. $\alpha_Y > \alpha(k,n)$. (Received December 09, 2008)