1017-53-128 **Stefan Wenger*** (wenger@cims.nyu.edu), 251 Mercer Street, Courant Institute, New York, NY 10012. *Isoperimetric inequalities and the large scale geometry of Hadamard spaces.*

We discuss some aspects of isoperimetric inequalities for k-dimensional Lipschitz cycles and integral currents in complete CAT(0)-spaces and in complete metric spaces X admitting cone type inequalities. We first show that such X admit isoperimetric inequalities of Euclidean type for k-dimensional cycles. This means that the volume needed to fill a cycle of volume r is bounded above by $Cr^{(k+1)/k}$ for some constant C depending only on k and X. This extends a result of M. Gromov from the context of Riemannian manifolds to that of metric spaces. We furthermore show: If all asymptotic cones of X have 'dimension' strictly less than $k+1$ in the sense that images of Lipschitz maps from $\mathbb{R}^{k+1}$ have $(k+1)$-dimensional measure 0 then X admits an isoperimetric inequality of sub-Euclidean type for k-dimensional cycles. As a consequence we obtain that a proper cocompact Hadamard space admits isoperimetric inequalities of sub-Euclidean type above the dimension of its Euclidean rank. In particular, isoperimetric inequalities can be used to detect the Euclidean rank of proper cocompact Hadamard spaces. A conjecture of Gromov asserts that such a space should even admit linear isoperimetric inequalities above its Euclidean rank. (Received February 17, 2006)