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Upper bound on the revised first Betti number and torus stability for RCD spaces

Abstract: It was shown by Gromov and Gallot that for a fixed dimension n there exists a positive number $\varepsilon(n)$ so that any n-dimensional closed Riemannian manifold (M, g) satisfying $\mathrm{Ricci}\,\mathrm{diam}^2 \geq -\varepsilon(n)$ must have first Betti number smaller than or equal to n. Later on, Cheeger and Colding showed that if the first Betti number of M equals n then (M, g) has to be bi-Hölder homeomorphic to a flat torus.

In this talk we will generalize the previous results to the case of $\mathrm{RCD}(K, N)$ spaces, which is the synthetic notion of riemannian manifolds satisfying Ricci $\geq K$ and $\dim \leq N$. This class of spaces include Ricci limit spaces and Alexandrov spaces.

Joint work with I. Mondello and A. Mondino.