

**RECOGNIZING THE FLAT TORUS AMONG $\text{RCD}^*(0, N)$
SPACES VIA THE STUDY OF THE FIRST COHOMOLOGY
GROUP**

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Abstract: A classical result due to Bochner says that for a compact, smooth and connected Riemannian manifold with non-negative Ricci curvature, the dimension of the first cohomology group is bounded from above by the dimension of the manifold. Moreover if these two dimensions are equal, then the manifold is the flat torus.

In this talk I present a generalization of this result to the non-smooth setting of RCD spaces, by proving that if the dimension of the first cohomology group of a $\text{RCD}^*(0, N)$ space is N , then it is possible to construct an isomorphism between the space and the N -dimensional torus, equipped with its Riemannian distance and a constant multiple of the induced volume measure.