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Constancy of the dimension in codimension one and locality of the unit normal on RCD(K, N) spaces

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Abstract. The aim of this paper is threefold. We first prove that, on RCD(K, N) spaces, the boundary measure of any set with finite perimeter is concentrated on the n-regular set $\mathcal{R}_n$, where $n \leq N$ is the essential dimension of the space. After, we discuss localization properties of the unit normal providing representation formulae for the perimeter measure of intersections and unions of sets with finite perimeter. Finally, we study Gauss-Green formulae for essentially bounded divergence measure vector fields, sharpening the analysis in [21].

These tools are fundamental for the development of a regularity theory for local perimeter minimizers on RCD(K, N) spaces in [50].

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