

## Rectifiability of planes and Alberti representations

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**Abstract.** We study metric measure spaces that have quantitative topological control, as well as a weak form of differentiable structure. In particular, let  $X$  be a pointwise doubling metric measure space. Let  $U$  be a Borel subset on which the blowups of  $X$  are topological planes. We show that  $U$  can admit at most 2 independent Alberti representations. Furthermore, if  $U$  admits 2 Alberti representations, then the restriction of the measure to  $U$  is 2-rectifiable. This is a partial answer to the case  $n = 2$  of a question of the second author and Schioppa.

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