

Contents

1	Introduction	1
1.1	Brief highlights of main results	1
1.1.1	A conjectural isomorphic reverse isoperimetric phenomenon	5
1.2	Basic notation	11
1.3	Lipschitz extension	12
1.4	A volumetric upper bound on the Lipschitz extension modulus	17
1.5	A dimension-independent extension theorem	25
1.6	Isomorphic reverse isoperimetry	27
1.6.1	A spectral interpretation, reverse Faber–Krahn and the Cheeger space of a normed space	30
1.6.2	Symmetries and positions	35
1.6.3	Intersection with a Euclidean ball	50
1.7	Randomized clustering	51
1.7.1	Basic definitions related to random partitions	52
1.7.2	Iterative ball partitioning	53
1.7.3	Separation and padding	54
1.7.4	From separation to Lipschitz extension	57
1.7.5	Bounds on the separation and padding moduli of normed spaces	58
1.7.6	Dimension reduction	67
1.8	Consequences in the linear theory	69
2	Lower bounds	75
2.1	Proof of Theorem 13	75
2.2	Proof of (1.105)	85
2.3	Hölder extension	86
2.4	Justification of (1.25)	91
2.5	Proof of the lower bound on $\text{SEP}(\mathbf{X})$ in Theorem 3	91
2.6	Proof of the lower bound on $\text{PAD}_\delta(\mathbf{X})$ in Theorem 69	97
2.7	Proof of Proposition 87	100
3	Preliminaries on random partitions	103
3.1	Standard set-valued mappings	105
3.2	Proximal selectors	107
3.3	Measurability of iterative ball partitioning	112

4 Upper bounds on random partitions	117
4.1 Proof of Theorem 75 and the upper bound on $\text{PAD}_\delta(\mathbf{X})$	
in Theorem 69	117
4.1.1 Proof of the first inequality in (4.22)	129
4.2 Proof of Theorem 81	132
5 Barycentric-valued Lipschitz extension	137
5.1 Notational preliminaries	137
5.2 Refined extension moduli	139
5.3 Barycentric targets	145
5.4 Gentle partitions of unity	147
5.5 The multi-scale construction	149
6 Volume computations	157
6.1 Direct sums	157
6.2 Negatively correlated normed spaces	193
6.3 Volume ratio computations	196
7 Logarithmic weak isomorphic isoperimetry in minimum dual mean width position	211
References	217