

## Publication List of Gitta Kutyniok

### Journal Publications

1. E. Kaniuth and G. Kutyniok. Zeros of the Zak transform on locally compact abelian groups. *Proc. Amer. Math. Soc.* **126** (1998), 3561–3569.
2. G. Kutyniok. Linear independence of time-frequency shifts under a generalized Schrödinger representation. *Arch. Math.* **78** (2002), 135–144.
3. G. Kutyniok. The Zak transform on certain locally compact groups. *J. of Math. Sciences* **1** (2002), 62–85.
4. K. Gröchenig, D. Han, C. Heil, and G. Kutyniok. The Balian-Low theorem for symplectic lattices in higher dimensions. *Appl. Comput. Harmon. Anal.* **13** (2002), 169–176.
5. G. Kutyniok. Ambiguity functions, Wigner distributions and Cohen’s class for LCA groups. *J. Math. Anal. Appl.* **277** (2003), 589–608.
6. C. Heil and G. Kutyniok. Density of weighted wavelet frames. *J. Geom. Anal.* **13** (2003), 479–493.
7. G. Kutyniok. A qualitative uncertainty principle for functions generating a Gabor frame on LCA groups. *J. Math. Anal. Appl.* **279** (2003), 580–596.
8. G. Kutyniok. A weak qualitative uncertainty principle for compact groups. *Illinois J. Math.* **47** (2003), 709–724.
9. P.G. Casazza, G. Kutyniok, and M.C. Lammers. Duality principles in Frame Theory. *J. Fourier Anal. Appl.* **10** (2004), 383–408.
10. G. Kutyniok and T. Strohmer. Wilson bases for general time-frequency lattices. *SIAM J. Math. Anal.* **37** (2005), 685–711.
11. W. Czaja, G. Kutyniok, and D. Speegle. The geometry of the parameters of wave packet frames. *Appl. Comput. Harmon. Anal.* **20** (2006), 108–125.
12. G. Kutyniok. The local integrability condition for wavelet frames. *J. Geom. Anal.* **16** (2006), 155–166.
13. G. Kutyniok. Beurling density and shift-invariant weighted irregular Gabor systems. *Sampl. Theory Signal Image Process.* **5** (2006), 131–149.
14. P.G. Casazza, G. Kutyniok, and D. Speegle. A redundant version of the Rado-Horn Theorem. *Linear Algebra Appl.* **418** (2006), 1–10.
15. G. Kutyniok and D. Labate. The theory of reproducing systems on locally compact abelian groups. *Colloq. Math.* **106** (2006), 197–220.
16. G. Kutyniok and D. Labate. Construction of Regular and Irregular Shearlet Frames. *J. Wavelet Theory and Appl.* **1** (2007), 1–10.
17. R. Balan, P.G. Casazza, D. Edidin, and G. Kutyniok. A fundamental identity for Parseval frames. *Proc. Amer. Math. Soc.* **135** (2007), 1007–1015.
18. G. Kutyniok. Affine density, frame bounds, and the admissibility condition for wavelet frames. *Constr. Approx.* **25** (2007), 239–253.
19. P.G. Casazza and G. Kutyniok. A generalization of Gram-Schmidt orthogonalization generating all Parseval frames. *Adv. Comput. Math.* **27** (2007), 65–78.

20. C. Heil and G. Kutyniok. The Homogeneous Approximation Property for Wavelet Frames. *J. Approx. Theory* **147** (2007), 28–46.
21. P. G. Casazza, G. Kutyniok, D. Speegle, and J. C. Tremain. A Decomposition Theorem for frames and the Feichtinger Conjecture. *Proc. Amer. Math. Soc.* **136** (2008), 2043–2053.
22. W. Czaja, G. Kutyniok, and D. Speegle. Beurling dimension of Gabor pseudo frames of affine subspaces. *J. Fourier Anal. Appl.* **14** (2008), 514–537.
23. P. G. Casazza, G. Kutyniok, and S. Li. Fusion frames and distributed processing. *Appl. Comput. Harmon. Anal.* **25** (2008), 114–132.
24. S. Dahlke, G. Kutyniok, P. Maass, C. Sagiv, H.-G. Stark, and G. Teschke. The uncertainty principle associated with the continuous shearlet transform. *Int. J. Wavelets Multiresolut. Inf. Process.* **6** (2008), 157–181.
25. C. Heil and G. Kutyniok. Density of frames and Schauder bases of windowed exponentials. *Houston J. Math.* **34** (2008), 565–600.
26. K. Gröchenig, G. Kutyniok, and K. Seip. Landau’s necessary density conditions for LCA groups. *J. Funct. Anal.* **255** (2008), 1831–1850.
27. G. Kutyniok, A. Pezeshki, A. R. Calderbank, and T. Liu. Robust Dimension Reduction, Fusion Frames, and Grassmannian Packings. *Appl. Comput. Harmon. Anal.* **26** (2009), 64–76.
28. G. Kutyniok and D. Labate. Resolution of the wavefront set using continuous shearlets. *Trans. Amer. Math. Soc.* **361** (2009), 2719–2754.
29. G. Kutyniok and T. Sauer. Adaptive Directional Subdivision Schemes and Shearlet Multiresolution Analysis. *SIAM J. Math. Anal.* **41** (2009), 1436–1471.
30. S. Dahlke, G. Kutyniok, G. Steidl, and G. Teschke. Shearlet Coorbit Spaces and associated Banach Frames. *Appl. Comput. Harmon. Anal.* **27** (2009), 195–214.
31. B. G. Bodmann, P. G. Casazza, and G. Kutyniok. A Quantitative Notion of Redundancy for Finite Frames. *Appl. Comput. Harmon. Anal.* **30** (2011), 348–362.
32. R. Calderbank, P. G. Casazza, A. Heinecke, G. Kutyniok, and A. Pezeshki. Sparse Fusion Frames: Existence and Construction. *Adv. Comput. Math.* **35** (2011), 1–31.
33. B. Boufounos, G. Kutyniok, and H. Rauhut. Sparse Recovery from Combined Fusion Frame Measurements. *IEEE Trans. Inform. Theory* **57** (2011), 3864–3876.
34. P. Kittipoom, G. Kutyniok, and W.-Q Lim. Irregular Shearlet Frames: Geometry and Approximation Properties. *J. Fourier Anal. Appl.* **17** (2011), 604–639.
35. G. Kutyniok and W.-Q Lim. Compactly Supported Shearlets are Optimally Sparse. *J. Approx. Theory* **163** (2011), 1564–1589.
36. B. Han, G. Kutyniok, and Z. Shen. Adaptive Multiresolution Analysis Structures and Shearlet Systems. *SIAM J. Numer. Anal.* **49** (2011), 1921–1946.
37. P. G. Casazza, A. Heinecke, F. Kraher, and G. Kutyniok. Optimally Sparse Frames. *IEEE Trans. Inform. Theory* **57** (2011), 7279–7287.
38. P. Kittipoom, G. Kutyniok, and W.-Q Lim. Construction of Compactly Supported Shearlets. *Constr. Approx.* **35** (2012), 21–72.
39. G. Kutyniok, J. Lemvig, and W.-Q Lim. Optimally Sparse Approximations of 3D Functions by Compactly Supported Shearlet Frames. *SIAM J. Math. Anal.* **44** (2012), 2962–3017.

40. G. Kutyniok, M. Shahram, and X. Zhuang. ShearLab: A Rational Design of a Digital Parabolic Scaling Algorithm. *SIAM J. Imaging Sci.* **5** (2012), 1291–1332.
41. D. L. Donoho and G. Kutyniok. Microlocal Analysis of the Geometric Separation Problem. *Comm. Pure Appl. Math.* **66** (2013), 1–47.
42. G. Kutyniok, K. A. Okoudjou, F. Philipp, and E. K. Tuley. Scalable Frames. *Linear Algebra Appl.* **438** (2013), 2225–2238.
43. G. Kutyniok. Clustered Sparsity and Separation of Cartoon and Texture. *SIAM J. Imaging Sci.* **6** (2013), 848–874.
44. F. Kraher, G. Kutyniok, and J. Lemvig. Sparsity and spectral properties of dual frames. *Linear Algebra Appl.* **439** (2013), 982–998.
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46. G. Kutyniok. Geometric Separation by Single-Pass Alternating Thresholding. *Appl. Comput. Harmon. Anal.* **36** (2014), 23–50.
47. E. J. King, G. Kutyniok, and X. Zhuang. Analysis of Inpainting via Clustered Sparsity and Microlocal Analysis. *J. Math. Imaging Vis.* **48** (2014), 205–234.
48. P. Grohs and G. Kutyniok. Parabolic Molecules. *Found. Comput. Math.* **14** (2014), 299–337.
49. F. Kraher, G. Kutyniok, and J. Lemvig. Sparse Matrices in Frame Theory. *Comput. Stat.* **29** (2014), 547–568.
50. M. Genzel and G. Kutyniok. Asymptotic Analysis of Inpainting via Universal Shearlet Systems. *SIAM J. Imaging Sci.* **7** (2014), 2301–2339.
51. B. Bodmann, G. Kutyniok, and X. Zhuang. Gabor Shearlets. *Appl. Comput. Harmon. Anal.* **38** (2015), 87–114.
52. B. Adcock, A. C. Hansen, G. Kutyniok, and J. Ma. Linear Stable Sampling Rate: Optimality of 2D Wavelet Reconstructions from Fourier Measurements. *SIAM J. Math. Anal.* **47** (2015), 1196–1233.
53. X. Chen, G. Kutyniok, K. A. Okoudjou, F. Philipp, and R. Wang. Measures of Scalability. *IEEE Trans. Inform. Theory* **61** (2015), 4410–4423.
54. H. Lakshman, W.-Q Lim, H. Schwarz, D. Marpe, G. Kutyniok, and T. Wiegand. Image interpolation using Shearlet based iterative refinement. *Signal Proc. Image Comm.* **36** (2015), 83–94.
55. G. Kutyniok, W.-Q Lim, and R. Reisenhofer. ShearLab 3D: Faithful Digital Shearlet Transforms based on Compactly Supported Shearlets. *ACM Trans. Math. Software* **42** (2016), Article No.: 5.
56. D. Mücke-Herzberg, P. Abellan, M. Sarahan, I. Godfrey, Z. Saghi, R. Leary, A. Stevens, J. Ma, G. Kutyniok, F. Azough, R. Freer, P. Midgley, N. Browning, and Q. Ramasse. Practical Implementation of Compressive Sensing for High Resolution STEM. *Microsc. Microanal.* **22(S3)** (2016), 558–559.
57. P. Grohs, S. Keiper, G. Kutyniok, and M. Schäfer. Cartoon Approximation with  $\alpha$ -Curvelets. *J. Fourier Anal. Appl.* **22** (2016), 1235–1293.
58. G. Kutyniok and W.-Q Lim. Dualizable Shearlet Frames and Sparse Approximation. *Constr. Approx.* **44** (2016), 53–86.

59. P. Grohs, S. Keiper, G. Kutyniok, and M. Schäfer.  $\alpha$ -Molecules. *Appl. Comput. Harmon. Anal.* **41** (2016), 297–336.
60. G. Kutyniok and P. Petersen. Classification of Edges using Compactly Supported Shearlets. *Appl. Comput. Harmon. Anal.* **42** (2017), 245–293.
61. G. Kutyniok, V. Mehrmann, and P. Petersen. Regularization and Numerical Solution of the Inverse Scattering Problem Using Shearlet Frames. *J. Inverse Ill-Posed Probl.* **25** (2017), 287–309.
62. G. Kutyniok, V. Paternostro, and F. Philipp. The Effect of Perturbations of Frame Sequences and Fusion Frames on Their Duals. *Oper. Matrices* **11** (2017), 301–336.
63. T. Conrad, N. Cvetkovic, M. Genzel, G. Kutyniok, C. Schtte, J. Vybiral, and N. Wulkow. Sparse Proteomics Analysis – a compressed sensing-based approach for feature selection and classification of high-dimensional proteomics mass spectrometry data. *BMC Bioinformatics* **18** (2017), 160–180.
64. S. Keiper, G. Kutyniok, D. G. Lee, and G. E. Pfander. Compressed Sensing for Finite-Valued Signals. *Linear Algebra Appl.* **532** (2017), 570–613.
65. A. Flinth and G. Kutyniok. PROMP: A Sparse Recovery Approach to Lattice-Valued Signals. *Appl. Comput. Harmon. Anal.* **45** (2018), 668–708.
66. R. Reisenhofer, S. Bosse, G. Kutyniok, and T. Wiegand. A Haar Wavelet-Based Perceptual Similarity Index for Image Quality Assessment. *Signal Proc. Image Comm.* **61** (2018), 33–43.
67. G. Kutyniok and W.-Q Lim. Optimal Compressive Imaging of Fourier Data. *SIAM J. Imaging Sci.* **11** (2018), 507–546.
68. W. Dahmen, W.-Q Lim, G. Kutyniok, C. Schwab, and G. Welper. Adaptive Anisotropic Petrov-Galerkin Methods for First Order Transport Equations. *J. Comput. Appl. Math.* **340** (2018), 191–220.
69. J. Ma, M. März, S. Funk, J. Schulz-Menger, G. Kutyniok, T. Schaeffter, and C. Kolbitsch. Shearlet-based compressed sensing for fast 3D cardiac MR imaging using iterative reweighting. *Phys. Med. Biol.* **63** (2018), 235004.
70. F. Sureau, F. Voigtlaender, M. Wust, J.-L. Starck, and G. Kutyniok. Learning sparse representations on the sphere. *Astron. Astrophys.* **621** (2019), A73.
71. H. Bölcskei, P. Grohs, G. Kutyniok, and P. Petersen. Optimal Approximation with Sparsely Connected Deep Neural Networks. *SIAM J. Math. Data Sci.* **1** (2019), 8–45.
72. T. A. Bubba, G. Kutyniok, M. Lassas, M. März, W. Samek, S. Siltanen, and V. Srinivasan. Learning The Invisible: A Hybrid Deep Learning-Shearlet Framework for Limited Angle Computed Tomography. *Inverse Probl.* **35**, 2019.
73. H. Andrade-Loarca, G. Kutyniok, O. Öktem, and P. Petersen. Extraction of digital wavefront sets using applied harmonic analysis and deep neural networks. *SIAM J. Imaging Sci.* **12** (2019), 1936–1966.
74. I. Gühring, G. Kutyniok, and P. Petersen. Error bounds for approximations with deep ReLU neural networks in  $W^{s,p}$  norms. *Anal. Appl.*, **18** (2020), 803–859.
75. G. Kutyniok. Discussion of “Nonparametric regression using deep neural networks with ReLU activation function”, *Ann. Stat.* **48** (2020), 1902–1905.
76. P. Grohs, G. Kutyniok, J. Ma, P. Petersen, and M. Raslan. Anisotropic Multiscale Systems on Bounded Domains. *Adv. Comput. Math.* **46** (2020), Article No.: 39.

77. G. Kutyniok, P. Petersen, M. Raslan, and R. Schneider. A Theoretical Analysis of Deep Neural Networks and Parametric PDEs. *Constr. Approx.*, to appear (arXiv:1904.00377).
78. M. Genzel, G. Kutyniok and M. März.  $\ell_1$ -Analysis Minimization and Generalized (Co-) Sparsity: When Does Recovery Succeed? *Appl. Comput. Harmon. Anal.*, to appear (arXiv:1710.04952).
79. S. Wäldchen, J. Macdonald, S. Hauch, and G. Kutyniok. The Computational Complexity of Understanding Network Decisions. *J. Artif. Intell. Res.*, to appear (arXiv:1905.09163).
80. H. Andrade-Loarca, G. Kutyniok, and O. Öktem. Shearlets as Feature Extractor for Semantic Edge Detection: The Model-Based and Data-Driven Realm. *P. Roy. Soc. A*, to appear (arXiv:1911.12159).
81. R. Gribonval, G. Kutyniok, M. Nielsen, and F. Voigtlaender. Approximation spaces of deep neural networks. *Constr. Approx.*, to appear (arXiv:1905.01208).

### Preprints

1. R. Levie, W. Huang, L. Bucci, M. M. Bronstein, and G. Kutyniok. Transferability of Spectral Graph Convolutional Neural Networks. Preprint, arXiv:1907.12972.
2. R. Levie, H. Avron, and G. Kutyniok. Quasi Monte Carlo Time-Frequency Analysis. Preprint, arXiv:2011.02025.
3. R. Levie, C. Yapar, G. Kutyniok, and G. Caire. RadioUNet: Fast Radio Map Estimation with Convolutional Neural Networks. Preprint, arXiv:1911.09002.
4. C. Yapar, R. Levie, G. Kutyniok, and G. Caire. Real-time Localization Using Radio Maps. Preprint, arXiv:2006.05397.
5. J. Macdonald, S. Wäldchen, S. Hauch, and G. Kutyniok. A Rate-Distortion Framework for Explaining Neural Network Decisions. Preprint, arXiv:1905.11092.
6. V. Tiep Do, R. Levie, and G. Kutyniok. Analysis of simultaneous inpainting and geometric separation based on sparse decomposition. Preprint, arXiv:2009.09398.
7. A. Hashemi, C. Cai, G. Kutyniok, K.-R. Müller, S.S. Nagarajan, and S. Haufe. Unification of Sparse Bayesian Learning Algorithms for Electromagnetic Brain Imaging with the Majorization Minimization Framework. Preprint, <https://doi.org/10.1101/2020.08.10.243774>.
8. M. Geist, P. Petersen, M. Raslan, R. Schneider, and G. Kutyniok. Numerical Solution of the Parametric Diffusion Equation by Deep Neural Networks. Preprint, arXiv:2004.12131.
9. A. Goeßmann and G. Kutyniok. The Restricted Isometry of ReLU Networks: Generalization through Norm Concentration. Preprint, arXiv:2007.00479.
10. M. Seleznova and G. Kutyniok. Analyzing Finite Neural Networks: Can We Trust Neural Tangent Kernel Theory? Preprint, arXiv:2012.04477.

### Refereed Conference Proceedings

1. G. Kutyniok. Computation of the density of weighted wavelet systems. In *Wavelets X* (San Diego, CA, 2003), SPIE Proc. **5207**, M. A. Unser, A. Aldroubi, and A. F. Laine, eds., SPIE, Bellingham, WA (2003), 393–404.
2. P.G. Casazza and G. Kutyniok. Frames of subspaces. In *Wavelets, Frames and Operator Theory* (College Park, MD, 2003), C. Heil, P. E. T. Jorgensen, and D. R. Larson, eds., Contemp. Math. **345**, Amer. Math. Soc., Providence, RI (2004), 87–113.

3. D. Labate, W-Q. Lim, G. Kutyniok, and G. Weiss. Sparse multidimensional representation using shearlets. In *Wavelets XI* (San Diego, CA, 2005), SPIE Proc. **5914**, M. Papadakis, A. F. Laine, and M. A. Unser, eds., SPIE, Bellingham, WA (2005), 254–262.
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5. P.G. Casazza, G. Kutyniok, and M.C. Lammers. Duality principles, localization of frames, and Gabor theory. In *Wavelets XI* (San Diego, CA, 2005), SPIE Proc. **5914**, M. Papadakis, A. F. Laine, and M. A. Unser, eds., SPIE, Bellingham, WA (2005), 389–398.
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7. K. Guo, G. Kutyniok, and D. Labate. Sparse Multidimensional Representations using Anisotropic Dilation and Shear Operators. In *Wavelets and Splines* (Athens, GA, 2005), G. Chen and M. J. Lai, eds., Nashboro Press, Nashville, TN (2006), 189–201.
8. P. G. Casazza, G. Kutyniok, S. Li, and C. J. Rozell. Modeling Sensor Networks with Fusion Frames. In *Wavelets XII* (San Diego, CA, 2007), 67011M-1–67011M-11, SPIE Proc. **6701**, D. Van De Ville, V. K. Goyal, and M. Papadakis, eds., SPIE, Bellingham, WA (2007).
9. G. Kutyniok and T. Sauer. From Wavelets to Shearlets and back again. In *Approximation Theory XII* (San Antonio, TX, 2007), M. Neamtu and L. Schumaker, eds., Nashboro Press, Nashville, TN (2008), 201–209.
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12. A. Pezeshki, G. Kutyniok, and A. R. Calderbank. Fusion frames and Robust Dimension Reduction. *42nd Annual Conference on Information Sciences and Systems (CISS)* (Princeton University, NJ, 2008), 2008, 264–268.
13. D. L. Donoho and G. Kutyniok. Analysis of  $\ell_1$  Minimization in the Geometric Separation Problem. *42nd Annual Conference on Information Sciences and Systems (CISS)* (Princeton University, NJ, 2008), 2008, 274–279.
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18. G. Kutyniok, M. Shahram, and D. L. Donoho. Development of a Digital Shearlet Transform Based on Pseudo-Polar FFT. *Wavelets XIII* (San Diego, CA, 2009), 74460B-1–74460B-13 SPIE Proc. **7446**, D. Van De Ville, V. K. Goyal, and M. Papadakis, eds., SPIE, Bellingham, WA, 2009.
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22. B. Boufounos, G. Kutyniok, and H. Rauhut. Average Case Analysis of Sparse Recovery from Combined Fusion Frame Measurements. *43rd Annual Conference on Information Sciences and Systems (CISS)* (Princeton University, NJ, 2010), 2010.
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24. G. Kutyniok and W.-Q Lim. Shearlets on Bounded Domains. *Approximation Theory XIII (San Antonio, TX, 2010)*, Springer Proc. Math. 13, 187–206, Springer, 2012.
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29. G. Kutyniok, J. Lemvig, and W.-Q Lim. Optimally Sparse Approximations of Multivariate Functions Using Compactly Supported Shearlet Frames. *SampTA'11* (Singapore, 2011), Proc., 2011.
30. G. Kutyniok and W.-Q Lim. Image Separation using Wavelets and Shearlets. *Curves and Surfaces* (Avignon, France, 2010), Lecture Notes in Computer Science, 416–430, Springer, 2010.
31. E. J. King, G. Kutyniok, and X. Zhuang. Analysis of Data Separation and Recovery Problems using Clustered Sparsity. *Wavelets and Sparsity XIV* (San Diego, CA, 2009), 813818-1–813818-11, SPIE Proc. **8138**, M. Papadakis, D. Van De Ville, V.K. Goyal, eds., SPIE, Bellingham, WA, 2011.

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33. G. Kutyniok, K. Okoudjou and F. Philipp. Perfect Preconditioning of Frames by a Diagonal Operator. *10th International Conference on Sampling Theory and Applications* (Bremen, Germany, 2013), 85–88, *Eurasip*, 2013.
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