

# List of Publications

## Karlheinz Gröchenig

### A. Book

1. Foundations of Time-Frequency Analysis. 360 pp., Birkhäuser, Boston, 2001.
2. Wiener's Lemma: Theme and Variations. An Introduction to Spectral Invariance. in "Four Short Courses on Harmonic Analysis. Wavelets, Frames, Time-Frequency Methods, and Applications to Signal and Image Analysis". With B. Forster, P. Massopust, O. Christensen, D. Labate, P. Vandergheynst, G. Weiss, Y. Wiaux. Birkhäuser, Applied and Numerical Harmonic Analysis. Boston. 2010.

### B. Book Chapters

1. Non-orthogonal wavelet and Gabor expansions and group representations. In "Wavelets and Their Applications", M. B. Ruskai et al., eds., pp. 353 – 376, Jones and Bartlett, Boston, 1992. (with H. G. Feichtinger)
2. Gabor Wavelets and the Heisenberg group: Gabor expansions and short time Fourier transform from the group theoretical point of view. In "Wavelets: A Tutorial in Theory and Applications", Charles K. Chui, ed., pp. 359 – 397, Academic Press, Boston , 1992 (with H. G. Feichtinger)
3. Theory and practice of irregular sampling. In "Wavelets: Mathematics and Applications", J. Benedetto, M. Frazier, eds., pp. 305 – 363, CRC Press. (with H. G. Feichtinger), 1994.
4. Aspects of Gabor Analysis on Locally Compact Abelian Groups. "Gabor Analysis and Algorithms", H. G. Feichtinger, Th. Strohmer, eds., pp. 211 – 231, Birkhäuser, Boston, 1998.
5. Non-Uniform Sampling in Higher Dimensions: From Trigonometric Polynomials to Band-Limited Functions. In "Modern Sampling Theory: Mathematics and Applications", Chap. 7, pp. 155 – 171, J. J. Benedetto, P. Ferreira, eds., Birkhäuser, Boston, 2001.
6. Numerical and theoretical aspects of non-uniform sampling of band-limited images. Chapter 6 in "Nonuniform Sampling: Theory and Applications", F. Marvasti, ed., Kluwer, 2001, pp. 283 – 324 (with Thomas Strohmer)
7. Uncertainty principles for time-frequency representations. In "Advances in Gabor Analysis", H. G. Feichtinger, T. Strohmer, eds., pp. 11–30, Birkhauser, Boston, 2003.

8. A pedestrian's approach to pseudodifferential operators. In "Harmonic Analysis and Applications", pp. 139-170. Volume in Honor of John J. Benedetto's 65th Birthday. C. Heil, ed., Birkhauser, Boston, 2006.
9. Localization Operators and Time-Frequency Analysis, in "Harmonic, Wavelet and  $p$ -adic Analysis, Eds. N. M. Chong et al. (pp. 83-109), 2007 World Scient. Publ. (with Elena Cordero and Luigi Rodino)
10. Weight functions in time-frequency analysis. In "Pseudodifferential Operators: Partial Differential Equations and Time-Frequency Analysis", L. Rodino et al., eds., Fields Institute Comm. 52, pp. 343 – 366, 2007.

### C. Articles in Refereed Journals

1. Fast konstante Folgen und gleichmässige Gleichverteilung in lokalkompakten Gruppen. Ph. D. Thesis. University of Vienna, 1984/85.
2. Separabilität, Gleichverteilung und Fastperiodizität. Anzeiger d. Österr. Akad. d. Wissensch., math.-naturwiss. Kl. 121, 117 – 119 (1984) (with V. Losert, H. Rindler)
3. Almost constant sequences and well-distribution in locally compact groups. Monatsh. Math. 100, 171 – 182 (1985).
4. Wesentliche Indexfolgen und gleichmässige Gleichverteilung. Sitzungsber. Österr. Akad. d. Wissensch., math.-naturwiss. Kl. 195, 225 – 238 (1986).
5. Uniform distribution in solvable groups. In "Probability Measures on Groups VIII", Proc. Oberwolfach 1985, H. Heyer, ed., 97 – 107, Lect. Notes in Math. 1210, Springer, 1986 (with V.Losert, H. Rindler)
6. Analyse multi-echelle et bases d'ondelettes. C. R. Acad. Sci. Paris, Ser.I, 305, 13 – 15 (1987).
7. Banach spaces related to integrable group representations and their atomic decompositions I. J. Functional Anal. 86, 307 – 340 (1989). (with H. G. Feichtinger)
8. Banach spaces related to integrable group representations II. Monatsh. Math. 108, 129 – 148 (1989). (with H. G. Feichtinger)
9. Iterative reconstruction of multivariate band-limited functions from irregular sampling values. SIAM J. Math. Anal. 23 (1992), 244 – 261. (with H. G. Feichtinger)

10. Irregular sampling theorems and series expansions of band-limited functions. *J. Math. Anal. Appl.* 167 (1992), 530 – 556 (with H. G. Feichtinger)
11. Error analysis in regular and irregular sampling theory. *Applicable Anal.* 50 (1993), 167 – 189 (with H. G. Feichtinger).
12. Describing functions: atomic decompositions versus frames. *Monatsh. Math.* 112 (1991), 1 – 42.
13. Reconstruction algorithms in irregular sampling. *Math. Comp.* 59 (1992), 181 – 194.
14. Multiresolution Analysis, Haar bases and self-similar tilings of  $R^n$ . *IEEE Trans. Inform. Th.* 38(2), Part 2 (1992), 556 – 568 (with W.R. Madych).
15. Wilson Bases and Modulation Spaces. *Math. Nachr.* 155 (1992), 7 – 17 (with H. G. Feichtinger, D. Walnut).
16. A Riesz basis for Bargmann-Fock space related to sampling and interpolation. *Arkiv f. Math.* 30 (1992), 283 – 295. (with D. Walnut)
17. Compact open sets in duals and projections in  $L^1$ -algebras of certain semi-direct product groups. *Math. Proc. Cambridge Phil. Soc.* 111 (1992), 545 – 556 (with E. Kaniuth and K. Taylor)
18. Self-similar lattice tilings. *J. Fourier Anal. Appl.* 1 (1994), 131 – 170 (with A. Haas).
19. Irregular sampling of wavelet and short time Fourier transforms. *Constr. Approx.* 9 (1993), 283 – 297.
20. A discrete theory of irregular sampling. *Lin. Alg. Appl.* 193 (1993), 129 – 150.
21. Acceleration of the frame algorithm. *IEEE Trans. Signal Proc.*, Special Issue on Wavelets and Signal Processing, Vol. 41(12), (1993), 3331 – 3340.
22. Orthogonality criteria for compactly supported scaling functions. *Appl. Comp. Harm. Anal.* 1 (1994), 242 – 245.
23. Backward continued fractions, Hecke groups and invariant measures for transformations of the interval. *J. Erg. Theory Dynamical Systems* 16 (1996), 1241 – 1274 (with A. Haas).
24. Efficient numerical methods in non-uniform sampling theory. *Num. Math.* 69/4 (1995), 423 – 440 (with H. G. Feichtinger and Th. Strohmer)

25. Irregular Sampling, Toeplitz Matrices, and the Approximation of Entire Functions of Exponential Type. *Math. Comp.* 68 (1999), pp. 749-765.
26. On Landau's necessary density conditions for sampling and interpolation of band-limited functions. *J. London Math. Soc.* 54 (1996), 557 – 565 (with H. Razafinjatovo).
27. Backward continued fractions and their invariant measures. (with A. Haas) *Bull. Can. Math. Soc.* 39 (1996), 186 – 198.
28. Oversampled Wilson expansions. *Signal Proc. Letters.* 4(4) (1997), 106 – 108. (with H. Boelcskei, H. Feichtinger, F. Hlawatsch)
29. Regularity of multivariate refinable functions. *Constr. Approx.* 15( 1999), 241 – 255. (with Albert Cohen and Lars Villemoes).
30. Self-affine tilings with several tiles. *Appl. Comp. Harm. Anal.* 7 (1999), 211 – 238. (with A. Haas and A. Raugi)
31. Invariant measures for certain linear fractional transformations mod 1. *Proc. Amer. Math. Soc.* 127 (1999), pp. 3439-3444. (with A. Haas)
32. Modulation spaces and pseudodifferential operators. *J. Integral Equ. Operator Theory* 34 (4) (1999), 439 – 458. (with C. Heil)
33. A new approach to interpolating scaling functions. *Applicable Anal.* 72 (1999), 485 – 500. (with S. Dahlke, P. Maass)
34. Non-linear approximation with local Fourier bases. *Constr. Approx.* 16(3), 317 – 332 (2000) (with S. Samarah)
35. Nonperiodic sampling and the local three squares theorem. *Ark. Mat.* 38 (2000), 77 – 92 (With C. Heil, D. Walnut).
36. An uncertainty principle related to the Poisson summation formula. *Studia Math.* 121 (1996), 87 – 104.
37. Gabor Frames and Time-Frequency Analysis of Distributions. *J. Functional Anal.* 146 (1997), 464 – 495 (with H. G. Feichtinger)
38. Tight compactly supported wavelet frames of arbitrarily high smoothness. *Proc. Amer. Math. Soc.* 126 (1998), 1101 – 1107 (with Amos Ron)
39. Beurling-Landau-type theorems for non-uniform sampling in shift invariant spline spaces. *J. Fourier Anal. Appl.* 6 (2000), 93 – 104 (with Akram Aldroubi).

40. Gabor meets Littlewood-Paley: Gabor expansions in  $L^p(\mathbb{R}^d)$ . *Studia Math.* 146 (2001), 15–33 (with Chris Heil).
41. Hardy’s theorem and the short-time Fourier transform of Schwartz functions. *J. London Math. Soc.* 63 (2001), 205 – 214. (with G. Zimmermann).
42. Non-uniform sampling and reconstruction in shift invariant spaces. *SIAM Review* 43(4) (2001), 585 – 620 (with Akram Aldroubi).
43. Direct and inverse approximation theorems for local trigonometric bases. *J. Approximation Theory* 117/1 (2002), 74 – 102 (with K. Bittner).
44. Letter to the Editor: A New Criterion for Gabor Frames. *J. Fourier Anal. Appl.* 8(2002), 507 – 512. (with A. J. E. M. Janssen).
45. Uncertainty principles as embeddings of modulation spaces. *J. Math. Anal. Appl.* 274(1), (2002), 181-202 (with E. Galperin)
46. Compactness criteria in function spaces. *Coll. Math.* 94 (2002), 37 – 50 (with M. Dörfler, H. G. Feichtinger)
47. Fast Local Reconstruction Methods for Nonuniform Sampling in Shift-Invariant Spaces. *SIAM J. Matrix Anal.* 24 (2003), 899 – 913 (with H. Schwab).
48. The Balian-Low theorem for symplectic lattices in higher dimensions. *Appl. Comp. Harm. Anal.* 13 (2002), 169-176. (with D. Han, C. Heil, G. Kutyniok)
49. Localized Frames are Finite Unions of Riesz Sequences. *Adv. Comp. Math.* 18 (2003), 149-157.
50. Localization of Frames, Banach Frames, and the Invertibility of the Frame Operator. *J. Fourier Anal. Appl.* 10(2) (2004), 105 – 132.
51. Gabor analysis in weighted amalgam spaces. *Sampling Theory in Signal and Image Processing* 1(3) (2003), 225 – 259 (with C. Heil, K. Okoudjou)
52. Time-frequency analysis of localization operators. *J. Functional Anal.* 205(1) (2003), 107 – 131 (with E. Cordero)
53. Weighted Group Algebras on Groups of Polynomial Growth. *Math. Z.* 102(3) (2003), 791 – 821 (with G. ler, M. Leinert, J. Ludwig, C. Molitor-Braun).
54. Spaces of Test Functions via the STFT. *J. Function Spaces Appl.* 2(1) (2004), 25 – 53 (with G. Zimmermann).
55. Wiener’s Lemma for Twisted Convolution and Gabor Frames. *J. Amer. Math. Soc.* 17 (2004), 1-18 (with M. Leinert).

56. Note on B-splines, wavelet scaling functions and Gabor frames. *IEEE Trans. Information Th.* 49(12) (2003), 3318 – 3320. (with A.J.E.M. Janssen, N. Kaiblinger, G. Pfander)
57. Generalized Anti-Wick Operators with Symbols in Distributional Sobolev spaces. *Int. Equ. Operator Th.* 48 (2004), 427 – 442. (with P. Boggiatto and E. Cordero)
58. Counterexamples for Boundedness of Pseudodifferential Operators. *Osaka Math. J.* 41 (2004), 1 – 11 (with C. Heil).
59. Localization of frames II. *Appl. Comp. Harm. Anal.* 17 (2004), 29 – 47 (with E. Cordero)
60. Random sampling of multivariate trigonometric polynomials. *SIAM J. Math. Anal.* 36(3)(2004), 773 – 795 (with R. F. Bass)
61. Modulation Spaces and a Class of Bounded Multilinear Pseudodifferential Operators. *J. Operator Theory* 54 (2005), 387 – 399 (with A. Benyi, C. Heil, K. Okoudjou).
62. Necessary conditions for Schatten class localization operators. *Proc. Amer. Math. Soc.* 133 (2005), 3573 – 3579 (with Elena Cordero).
63. Symmetry and Inverse-Closedness of Matrix Algebras and Symbolic Calculus for Infinite Matrices. *Trans. Amer. Math. Soc.* 358 (2006), 2695-2711. (with M. Leinert)
64. Intrinsic localization of frames. *Constr. Approx* 22 (2005), 395 – 415 . (with M. Fornasier).
65. Time-Frequency Analysis of Sjöstrand’s Class. *Revista Mat. Iberoam.* 22(2) (2006), 703-724.
66. A class of Fourier multipliers for modulation spaces. *Appl. Comp. Harm. Anal.* 19 (2005), 131 – 139 (with A. Bényi, L. Grafakos, K. Okoudjou)
67. Time-Frequency Partitions for the Gelfand Triple  $(S_0, L^2, S'_0)$ . *Math. Scand.* 98 (2006), 81 – 96 (with M. Dörfler, H. G. Feichtinger)
68. Composition and Spectral Invariance of Pseudodifferential Operators on Modulation Spaces. *J. Anal. Math.* 98 (2006), 65 – 82.
69. Operators commuting with a discrete subgroup of translations. *J. Geom. Anal.* 16 (2006), no. 1, 53-67 (with H. G. Feichtinger, H. Führ, N. Kaiblinger)
70. Symmetry of Weighted  $L^1$ -Algebras and the GRS-Condition. *Bull. London Math. Soc.* 38 (2006), 625 – 635. (with G. Fendler and M. Leinert).

71. Sampling theorems on locally compact groups from oscillation estimates. *Math. Z.* 255 (2007), 177 – 194 (with H. Führ)
72. Symbolic calculus and Fredholm property for localization operators. *J. Fourier Anal. Appl.* 12(3) (2006), 371-392 (with E. Cordero)
73. Pseudodifferential operators on locally compact abelian groups and Sjöstrand's symbol class . *J. Reine Angew. Math.* 613 (2007), 121 – 146. (with Thomas Strohmer).
74. Gabor frames with Hermite functions. *Comptes Rendus Acad. Sciences Ser. I.* 344 (2007), 157-162 (with Yurii Lyubarskii).
75. Unimodular Fourier multipliers for modulation spaces. *J. Functional Anal.* 246 (2007), 366 – 384. (with Arpad Benyi, Kasso Okoudjou, Luke Rogers).
76. Analysis, Optimization, and Implementation of Low-Interference Wireless Multicarrier Systems. *IEEE Trans. Wireless Comm.* 6(4) (2007), 1 – 11 (with G. Matz, D. Schafhuber, M. Hartmann, and F. Hlawatsch)
77. Gabor frames without inequalities. *International Mathematics Research Notices* 2007 (2007), rnm111-21.
78. The Homogeneous Approximation Property and the Comparison Theorem for Coherent Frames. *Sampling Th. Signal Image Proc.* 7(3) (2008), 271 – 279.
79. Convolution-dominated operators on discrete groups. *Integr. Equ. Oper. Th.* 61 (2008), 493 – 509 (with Gero Fendler, Michael Leinert).
80. Banach algebras of pseudodifferential operators and their almost diagonalization. *Ann. Inst. Fourier.* 58(7) (2008), 2279-2314. (with Z. Rzeszotnik)
81. Landau's necessary density conditions for LCA groups. *J. Functional Anal.* 255 (2008), 1831 – 1850. (with G. Kutyniok and K. Seip)
82. Random sampling of entire functions of exponential type in several variables. *Israel J. Math.* 177 (2010), 1 – 28. (with Richard Bass)
83. Molecules in Coorbit Spaces and Boundedness of Operators *Studia Math.* 192(1) (2009), 61 - 77 (With Mariusz Piotrowski).
84. Gabor (super)frames with Hermite functions. With Yurii Lyubarskii. *Math. Ann.* 345(2) (2009), 267 – 286.
85. Optimal Adaptive Computations in the Jaffard Algebra and Localized Frames. *J. Approx. Th.* 162 (2010) 153 - 185 (with Stephan Dahlke and Massimo Fornasier).

86. Pseudospectral Fourier Reconstruction with the Modified Inverse Polynomial Reconstruction Method. *J. Computational Physics* 229 (2010), 933 - 946. (With Tomasz Hrycak).
87. Noncommutative approximation: Inverse-Closed Subalgebras and Off-Diagonal Decay of Matrices. To appear in *Constr. Approx.* (With Andreas Klotz)
88. Frame constants of Gabor frames near the critical density. To appear in *J. Math. Pure Appl.* (with Alexander Borichev and Yura Lyubarskii)
89. Convergence Analysis of the Finite Section Method and Banach Algebras of Matrices. *Int. Equ. Op. Theory* 67 (2010), 183 – 202. (With Ziemowit Rzeszutnik and Thomas Strohmer).
90. Isomorphism properties of Toeplitz operators in time-frequency analysis. To appear in *J. Anal. Math.* (with Joachim Toft).
91. Representation and Approximation of Pseudodifferential Operators by Sums of Gabor Multipliers. To appear in *Appl. Anal.*

#### **D. Conference Proceedings and Non-Refereed Articles**

1. A unified approach to atomic decompositions via integrable group representations Proc. "Function Spaces and Applications", Conf. Lund 1986, Lect. Notes Math. 1302, p. 52 – 73, Springer (1988). (with H. G. Feichtinger)
2. Unconditional bases in translation and dilation invariant function spaces on  $\mathbb{R}^n$ . Proc. "Constructive Theory of Functions", Varna, 1987, p. 174 – 183, Publishing House of the Bulgarian Academy of Sciences, Sofia 1988.
3. Multidimensional irregular sampling of band-limited functions in  $L^p$ -spaces. Proc. Oberwolfach, "Approximation Theory", W. Schempp ed., ISNM 90, Birkhäuser, 1989, p.135 – 142. (with H. G. Feichtinger)
4. Nonorthogonal expansions of signals and some of their applications. 14 ÖAGM Arbeitstreffen, Salzburg 1990 on "Image Acquisition and Real-Time Visualization". G. Bernroider, A. Pinz, eds. p. 129 – 138, Oldenbourg, Wien-München, 1990. (with C. Cenker, H. G. Feichtinger)
5. A new approach to irregular sampling of band-limited functions. In "Recent Advances in Fourier Analysis and its Applications", p. 251 – 260, NATO ASI Series C, Vol. 315, J. S. and J. L. Byrnes eds., Kluwer, Dordrecht-Boston-London, 1990.
6. Iterative methods in irregular sampling theory. Numerical Results. 7. Aachener Symposium für Signaltheorie. ASST '90, p. 160 – 166, Springer, 1990. (with H. G. Feichtinger, M. Hermann)

7. Efficient Algorithms in irregular sampling of band-limited functions. 10. International Phoenix Conf. on Computers and Communication 1991, p. 490 – 495, IEEE Computer Soc., 1991.
8. Sharp results on random sampling of band-limited functions. In NATO ASI on “Probabilistic and Stochastic Methods in Analysis,with Applications”, NATO ASI Series C, Vol. 372, J. S. and J. L. Byrnes, et al., eds., pp. 323 – 335, Kluwer, Dordrecht-Boston-London, 1992.
9. Discrete-time Wilson expansions. (with H. Boelcskei, H. Feichtinger, F. Hlawatsch). Proc. IEEE Int. Sympos. Time-Frequency Time-Scale, Paris, June 1996, 525 – 528.
10. Biorthogonal box spline wavelet bases. Proc. “Surface Fitting and Multiresolution Methods”, A. Méhauté et al., eds., pp. 83 –92, Vanderbilt Univ. Press, 1997. Approx. Theory, Chamonix, 1996, pp. 83 – 92. (with Vera Latour and Stephan Dahlke).
11. Finite and Infinite-Dimensional Models of Non-Uniform Sampling. Proc. SampTA 97, Aveiro, Portugal, June 1997, pp. 285 – 290.
12. Modulation spaces as symbol classes for pseudodifferential operators. Proceedings of “International Conference on Wavelets and Applications” , Allied Publishers, Chennai, India, 2003, pp. 151-170 (with C. Heil)
13. Localization of frames. In ”GROUP 24: Physical and Mathematical Aspects of Symmetries” , edited by J-P. Gazeau, R. Kerner, J-P. Antoine, S. Metens, J-Y. Thibon; pp. 875 – 882, IOP Publishing, Bristol, 2003
14. On the Product of Localization Operators. In ”Modern Trends in Pseudo-Differential Operators”, Proceeding of ISAAC 2005, M. Wong, ed., Birkhäuser, 2007 (with Elena Cordero)
15. Advanced Mathematical Models for the Design and Optimization of Low-Interference Wireless Multicarrier Systems. Conf. Proc. MathMod, Vienna, 2006 (with G. Matz, F. Hlawatsch, A. Klotz, A. Skupch)
16. LSQR-based ICI equalization for multicarrier communications in strongly dispersive and highly mobile environments. Spawc 07 Conference Proceedings. June 2007 (with G. Tauböck, M. Hampejs, G. Matz, F. Hlawatsch)
17. On spectrality of the algebra of convolution dominated operators. Banach Center Publications, vol. 78 (2007), pp. 145-149. ”Noncommutative Harmonic analysis with applications to probability, M. Bozejko et al., eds. (with G. Fendler and M. Leinert)

18. Sequential LSQR-based ICI Equalization and Decision-feedback ISI Cancellation in Pulse-shaped Multicarrier Systems. Processings of the Tenth IEEE International Workshop on Signal Processing Advances in Wireless Communications (Spawc) 2009. (With Mario, Hampejs, Pavol Svac, Franz Hlawatsch, Gerald Matz)

#### **E. Book Reviews, Prefaces, Reports.**

1. Preface [Special Issue on Frame Theory and Sampling Problems in Time-Frequency Analysis and Wavelet Theory. Part I]. Int. J. Wavelets Multiresolut. Inf. Process. 3 (2005), no. 2, iii–iv. 42-06 (42C40) (with H. G. Feichtinger and Thomas Strohmer)
2. Book review of “Time-Frequency and Time-Scale Methods” by J. A. Hogan and J. D. Lakey. Bull. Amer. Math. Soc. 44(2) (2007), 285-290.
3. Quantitative estimates for the finite section method. Technical report (with Ziemowit Rzeszotnik and Thomas Strohmer)
4. Learning Trigonometric Polynomials from Random Samples and Exponential Inequalities for Eigenvalues of Random Matrices. Report, <http://arxiv.org/abs/math/0701781> (with Benedikt M. Pötscher and Holger Rauhut)

#### **F. Submitted Articles**

1. Time-Frequency partitions and characterizations of modulations spaces with localization operators. Preprint (with Monika Dörfler)
2. Inverse-closed Banach subalgebras of non-commutative tori (with Michael Leinert) IN PREPARATION
3. An uncertainty principle for the time-frequency plane (with Markus Neuhauer) IN PREPARATION
4. Multivariate Gabor Frames and Sampling of Entire Functions of Several Variables. Preprint.