

**Krzysztof Bogdan**

Faculty of Pure and Applied Mathematics  
Wrocław University of Technology  
Wybrzeże Wyspiańskiego 27, 50-370 Wrocław, Poland  
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**CURRICULUM VITAE****March 8, 2016****EDUCATION**

M.Sc. in Applied Mathematics, 1991  
Wrocław University of Technology, Poland  
Advisor: K. Samotij

Atomic decompositions of function spaces

Ph.D. in Mathematics, 1997  
Wrocław University of Technology, Poland  
Advisor: T. Byczkowski

Boundary Harnack principle for symmetric stable processes

Habilitation (Doctor of Science) in Stochastic Processes, 2002  
Wrocław University of Technology, Poland

Potential theory of Schrödinger operator based on fractional powers of Laplacian

Professorship in Mathematics, 2006  
Nomination by President of Poland

**EMPLOYMENT**

Research and Teaching Assistant, Wrocław University of Technology, 1990–1997

Assistant Professor, Wrocław University of Technology, 1997 – 2002

Associate Professor, Wrocław University of Technology, 2002 – 2003

Associate Professor, Institute of Mathematics, Polish Academy of Sciences, 2003 – 2005

Professor, Wrocław University of Technology, 2003–2010

Full Professor, Wrocław University of Technology, 2010–present

Associate Professor, Institute of Mathematics, Polish Academy of Sciences, 2011 – 2013

**VISITING POSITIONS**

Visiting Assistant Professor	University of Washington	
	Department of Mathematics	02.2000–08.2000
Visiting Assistant Professor	Purdue University	
	Department of Mathematics	08.2000–12.2001
	Department of Statistics	06.2004–08.2004
		06.2005–08.2005
Visiting Professor	Purdue University	
	Department of Statistics	06.2006–08.2006
		01.2007–08.2007
	Department of Mathematics	08.2009–12.2009
Visiting Lecturer	Stanford University	
	Department of Statistics	04.2013–06.2013

### AWARDS, HONORS

1986	III Prize at the Polish Mathematical Olympiad
1989–1991	The scholarship of Minister of National Education of Poland
1991	Marcinkiewicz Award for student's work in mathematics
1997	Award of the Dean of the Faculty of Fundamental Problems of Technology (Wrocław University of Technology) for Ph.D. thesis
2000	Individual Prize of III Division of the Polish Academy of Sciences
2003, 2006, 2010	Awards of the President of Wrocław University of Technology
2011	Award of the Institute of Mathematics of the Polish Academy of Sciences for outstanding achievements in mathematics

### PhD STUDENTS

1. Paweł Sztonyk, Boundary problems for stable Lévy processes, 10.2002
2. Bartłomiej Dyda, Boundary problems for stable jump processes, 01.2005
3. Karol Szczypkowski, Stochastic processes with drift, 06.2014
4. Sebastian Sydor, Estimates of integral kernels, 06.2014
5. Łukasz Wojciechowski, Stochastic analysis of Lévy processes, 10.2014

### TEACHING ABROAD

University of Washington: MATH 208 Linear Algebra

Purdue University: MA 262 Linear Algebra and Differential Equations, MA 303 Differential Equations and Partial Differential Equations for Engineering and the Sciences, STAT 501

Experimental Statistics, STAT 503 Statistical Methods for Biology  
Stanford University: STATS 218 Stochastic Processes

## GRANTS

1. grant KBN 2 1159 91 01, "Banach spaces of analytic functions", 1992–93 (principal investigator K. Samotij)
2. grant KBN 211629101, "Gaussian and stable processes", 1994 (principal investigator T. Byczkowski)
3. doctoral grant KBN, 2 P03A 010 10, "Boundary Harnack principle for symmetric stable processes", 1996 (advisor T. Byczkowski)
4. grant KBN 2 P03A 028 16, "Potential theory of stable processes", 1999-2002 (principal investigator T. Byczkowski)
5. grant KBN 2 P03A 041 22, "Potential theory of stable processes and their Feynman-Kac semigroups", 2002-2005 (principal investigator T. Byczkowski)
6. Research Training Network "Harmonic Analysis and Related Problems" HPRN-CT-2001-00273-HARP, 2002-2006
7. grant DBN MEN "Analytic methods in the potential theory of Markov processes", 2005-2008 (principal investigator K. Bogdan)
8. grant Young Scientist Programme "Construction of transition densities", 2008-2009 (supervisor principal K. Bogdan)
9. grant MNiSW "Markov Processes and semigroups of operators", 2009-2012 (principal investigator K. Bogdan)
10. grant NCN "Applications of stochastic analysis", 2013-2016 (principal investigator K. Bogdan)
11. grant NCN "Analysis of nonlocal operators", 2015-2018 (principal investigator K. Bogdan)

## CONFERENCES AND TALKS

1991 Polish Analysis Conference, Kazimierz Dolny, contributed talk

1993 Workshop on Wavelets, Vienna, contributed

- 1993 Colloque en l'Honneur de J.-P. Kahane, Paris
- 1998 Workshop on Geometric Stochastic Analysis and Fine Properties of Stochastic Processes, MSRI, Berkeley, invited
- 1998 University of Washington, invited
- 1998 International Conference on Statistical Inference STAT'98, Łagów
- 1999 International Conference on Harmonic Analysis, Zakopane, invited
- 1999 Analysis of Jump Processes and Their Generators, Workshop, Bielefeld, invited
- 1999 University of Washington, Purdue University, University of Illinois at Urbana-Champaign, invited
- 2000 Seminar on Stochastic Processes, Salt Lake City, contributed
- 2001 Seminar on Stochastic Processes, Gainesville
- 2003 University of Urbana-Champaign, invited
- 2003 IV ISAAC Congress (International Society for Analysis, its Applications and Computation), York University, Toronto, Canada, 11–16 VIII, contributed
- 2003 LMS Invited Lecture Series, University of Wales, Swansea, 24–30 VIII, invited
- 2003 Deutschen Mathematiker Vereinigung, Rostock, 14–19 IX, invited
- 2004 VIII Polish Probability Conference, Będlewo, 17–21 V, contributed
- 2004 International Workshop on Potential Theory, Matsue, 23–28 VIII, invited
- 2004 Jump-type Markov Processes and Stochastic Analysis, Osaka, 30 I–1 X, invited
- 2005 Fourth Symposium on Lévy Processes: Theory and Applications, Manchester, 10–14 I, invited
- 2005 XVI Congress of Polish Mathematicians, invited
- 2006 IX Polish Probability Conference, Będlewo, 22–26 V, contributed
- 2006 International Conference on Stochastic Analysis and Its Applications 7–11 VIII, Seattle, invited

- 2006 Deutschen Mathematiker Vereinigung, 18–22 IX, Bonn, invited
- 2006 University of Lublin and Technical University of Lublin, 14–15 XII, invited
- 2007 Purdue University and University of Illinois at Urbana-Champaign, invited
- 2007 32nd Conference on Stochastic Processes and their Applications, 6–8 VIII, Urbana-Champaign, contributed
- 2008 X Polish Probability Conference, Będlewo, 19–23 V, contributed
- 2008 2nd International Conference on Stochastic Analysis and Its Applications, 28-31 V, Seoul National University, invited
- 2008 Semigroups of Operators: Theory and Applications, 2–5 X, Nałęczów, Potential theory of the fractional Laplacian and its Schrödinger perturbations
- 2009 Workshop on Jump Processes - JUMPS 09, Dresden, 14–17 I, Stable processes and cones 1: Martin kernel
- 2009 Workshop "Schrödinger operators and stochastic processes", Wrocław, 14–15 V 2009, coorganizer
- 2009 XXVIII International Seminar on Stability Problems for Stochastic Models 31V 5VI, Zakopane, Heat kernel of fractional Laplacian in cones
- 2009 The Third International Conference on Stochastic Analysis and Its Applications, Pekin, 13-17 VII, Beijing Institute of Technology, Heat kernel estimates for the fractional Laplacian, invited
- 2010 Analysis, Geometry and Probability, Zakopane, 18-23 IV, Fractional Laplacian in cones
- 2010 Nonlocal operators and partial differential equations, Będlewo, 28 VI-2 VII, Nonlocal boundary value problems, coorganizer
- 2010 Józef Marcinkiewicz Centenary Conference, Poznań, 28 VI-2 VII, Martingale transforms and Fourier multipliers, plenary
- 2010 Lévy Processes: Theory and Applications, Drezno, 26-30 VII, Estimates of the Green function for fractional Laplacian perturbed by gradient, plenary

- 2010 4th International Conference on Stochastic Analysis and Its Application, 30 VIII-3 IX, Kansai University, Osaka, On Hardy spaces, invited
- 2010 34th conference on Stochastic Processes and Applications, Osaka, 6-10 IX, Schrödinger perturbations of transition densities, invited special session
- 2011 5th International Conference on Stochastic Analysis and its Applications, Bonn, 5-9 IX, invited
- 2011 Foundations of Stochastic Analysis, Banff International Research Station, 18-23, 2011, invited
- 2012 Probability and Related Aspects, Alba Iulia, 22-26 V, invited
- 2012 Nonlocal Operators: Analysis, Probability, Geometry and Applications, Bielefeld, 9-14 VII, invited
- 2012 6th International Conference on Stochastic Analysis and Its Application, Będlewo, 10-15 IX, organizer
- 2013 German-Polish Joint Conference on Probability Theory and Mathematical Statistics, Toru, Poland, 6-9 June, session organizer
- 2013 7th International Conference on Lévy Processes: Theory and Applications, Wrocław, and the Satellite Summer School, Bdlewo, organizer
- 2013 V Forum of the Polish Mathematical Society, 16-20 IX, contributed
- 2013 Semigroups of Operators: Theory and Applications, Bdlewo, 6-11 X, plenary
- 2013 Lévy Processes and Self-similarity, Hammamet, 4-9 XI, plenary
- 2014 Probabilistic Aspects of Harmonic Analysis, Bdlewo, 26 IV-3 V, plenary
- 2014 XXXII International Seminar on Stability Problems for Stochastic Models, Trondheim, 15-21 VI
- 2014 37th Conference on Stochastic Processes and their Applications, Buenos Aires, 28 VII-1 VIII, session organizer
- 2014 7th International Conference on Stochastic Analysis and its Applications, Seoul, 6-11 VIII, Scientific Committee

- 2014 Stochastic Processes, Analysis and Mathematical Physics, Osaka, 25-29 VIII, plenary
- 2014 DMV-PTM Mathematical Meeting, Poznań, 17-20 IX, contributed
- 2014 START- Workshop on Stochastic Analysis and Related Topics, Dresden, 22-23 IX, plenary
- 2014 MLSMA - Advances in Machine Learning for Social Media Analysis, Wrocław, 23-27 IX, instructor
- 2014 Workshop on Dirichlet Forms & Stochastic Analysis, Dresden, 26-27 X, plenary
- 2015 Probability and Analysis, Będlewo, 4-8 V, organizer
- 2016 3rd Conference on Nonlocal Operators and Partial Differential Equations, Będlewo, 27 VI-1 VII, organizer

**EDITORIAL BOARDS:**

Probability and Mathematical Statistics  
 Stochastics Processes and their Applications  
 Statistics & Probability Letters

**REVIEWER FOR:**

Annals of Probability, Bulletin of the London Mathematical Society, Electronic Communication in Probability, Colloquium Mathematicum, Communications in Mathematical Physics, Communications in Partial Differential Equations, Illinois Journal of Mathematics, Journal of Differential Equations, Journal of Functional Analysis, Journal of the European Mathematical Society, Journal of Mathematical Analysis and Applications, Latin American Journal of Probability and Mathematical Statistics, National Science Foundation, Potential Analysis, Probability and Mathematical Statistics, Studia Mathematica, Transactions of the American Mathematical Society, Semigroup Forum, Stochastic Processes and Applications, Polish Scientific Editors (PWN), Probability and Mathematical Statistics, Probability Theory and Related Fields.

**TOTAL CITATIONS (MathSciNet): 825 by 295 authors**

## PUBLICATIONS

- [1] Krzysztof Bogdan, Tomasz Grzywny, and Michał Ryznar. Barriers, exit time and survival probability for unimodal Lévy processes. *Probab. Theory Related Fields*, 162(1-2):155–198, 2015.
- [2] Krzysztof Bogdan and Sebastian Sydor. On nonlocal perturbations of integral kernels. In *Semigroups of operators—theory and applications*, volume 113 of *Springer Proc. Math. Stat.*, pages 27–42. Springer, Cham, 2015.
- [3] Krzysztof Bogdan, Bartłomiej Siudeja, and Andrzej Stós. Martin kernel for fractional Laplacian in narrow cones. *Potential Anal.*, 42(4):839–859, 2015.
- [4] Krzysztof Bogdan, Takashi Kumagai, and Mateusz Kwaśnicki. Boundary Harnack inequality for Markov processes with jumps. *Trans. Amer. Math. Soc.*, 367(1):477–517, 2015.
- [5] Krzysztof Bogdan, Tomasz Grzywny, and Michał Ryznar. Dirichlet heat kernel for unimodal Lévy processes. *Stochastic Process. Appl.*, 124(11):3612–3650, 2014.
- [6] Krzysztof Bogdan, Bartłomiej Dyda, and Tomasz Luks. On Hardy spaces of local and nonlocal operators. *Hiroshima Math. J.*, 44(2):193–215, 2014.
- [7] Krzysztof Bogdan and Tomasz Komorowski. Principal eigenvalue of the fractional Laplacian with a large incompressible drift. *NoDEA Nonlinear Differential Equations Appl.*, 21(4):541–566, 2014.
- [8] Krzysztof Bogdan and Karol Szczypkowski. Gaussian estimates for Schrödinger perturbations. *Studia Math.*, 221(2):151–173, 2014.
- [9] Krzysztof Bogdan, Tomasz Grzywny, and Michał Ryznar. Density and tails of unimodal convolution semigroups. *J. Funct. Anal.*, 266(6):3543–3571, 2014.
- [10] Krzysztof Bogdan, Wolfgang Hansen, and Tomasz Jakubowski. Localization and Schrödinger perturbations of kernels. *Potential Anal.*, 39(1):13–28, 2013.
- [11] Krzysztof Bogdan and Łukasz Wojciechowski. Parabolic martingales and non-symmetric Fourier multipliers. *Probab. Math. Statist.*, 32(2):241–253, 2012.
- [12] Krzysztof Bogdan, Tomasz Jakubowski, and Sebastian Sydor. Estimates of perturbation series for kernels. *J. Evol. Equ.*, 12(4):973–984, 2012.



- [13] Krzysztof Bogdan and Tomasz Jakubowski. Estimates of the Green function for the fractional Laplacian perturbed by gradient. *Potential Anal.*, 36(3):455–481, 2012.
- [14] Krzysztof Bogdan and Bartłomiej Dyda. The best constant in a fractional Hardy inequality. *Math. Nachr.*, 284(5-6):629–638, 2011.
- [15] Krzysztof Bogdan, Tomasz Grzywny, and Michał Ryznar. Heat kernel estimates for the fractional Laplacian with Dirichlet conditions. *Ann. Probab.*, 38(5):1901–1923, 2010.
- [16] Krzysztof Bogdan and Tomasz Grzywny. Heat kernel of fractional Laplacian in cones. *Colloq. Math.*, 118(2):365–377, 2010.
- [17] Krzysztof Bogdan, Tomasz Byczkowski, Tadeusz Kulczycki, Michał Ryznar, Renming Song, and Zoran Vondraček. *Potential analysis of stable processes and its extensions*, volume 1980 of *Lecture Notes in Mathematics*. Springer-Verlag, Berlin, 2009. Edited by Piotr Graczyk and Andrzej Stos.
- [18] Krzysztof Bogdan, Wolfgang Hansen, and Tomasz Jakubowski. Time-dependent Schrödinger perturbations of transition densities. *Studia Math.*, 189(3):235–254, 2008.
- [19] Krzysztof Bogdan, Tadeusz Kulczycki, and Mateusz Kwaśnicki. Estimates and structure of  $\alpha$ -harmonic functions. *Probab. Theory Related Fields*, 140(3-4):345–381, 2008.
- [20] Rodrigo Bañuelos and Krzysztof Bogdan. Lévy processes and Fourier multipliers. *J. Funct. Anal.*, 250(1):197–213, 2007.
- [21] Krzysztof Bogdan and Paweł Sztonyk. Estimates of the potential kernel and Harnack’s inequality for the anisotropic fractional Laplacian. *Studia Math.*, 181(2):101–123, 2007.
- [22] Krzysztof Bogdan and Tomasz Jakubowski. Estimates of heat kernel of fractional Laplacian perturbed by gradient operators. *Comm. Math. Phys.*, 271(1):179–198, 2007.
- [23] K. Bogdan and T. Żak. On Kelvin transformation. *J. Theoret. Probab.*, 19(1):89–120, 2006.

- [24] Krzysztof Bogdan and Tomasz Jakubowski. Problème de Dirichlet pour les fonctions  $\alpha$ -harmoniques sur les domaines coniques. *Ann. Math. Blaise Pascal*, 12(2):297–308, 2005.
- [25] Rodrigo Bañuelos and Krzysztof Bogdan. Symmetric stable processes in parabola-shaped regions. *Proc. Amer. Math. Soc.*, 133(12):3581–3587 (electronic), 2005.
- [26] Krzysztof Bogdan and Paweł Sztonyk. Harnack’s inequality for stable Lévy processes. *Potential Anal.*, 22(2):133–150, 2005.
- [27] Rodrigo Bañuelos and Krzysztof Bogdan. Symmetric stable processes in cones. *Potential Anal.*, 21(3):263–288, 2004.
- [28] Krzysztof Bogdan, Andrzej Stós, and Paweł Sztonyk. Harnack inequality for stable processes on  $d$ -sets. *Studia Math.*, 158(2):163–198, 2003.
- [29] Krzysztof Bogdan, Krzysztof Burdzy, and Zhen-Qing Chen. Censored stable processes. *Probab. Theory Related Fields*, 127(1):89–152, 2003.
- [30] Krzysztof Bogdan and Bartłomiej Dyda. Relative Fatou theorem for harmonic functions of rotation invariant stable processes in smooth domains. *Studia Math.*, 157(1):83–96, 2003.
- [31] Krzysztof Bogdan, Andrzej Stós, and Paweł Sztonyk. Potential theory for Lévy stable processes. *Bull. Polish Acad. Sci. Math.*, 50(3):361–372, 2002.
- [32] K. Bogdan, T. Kulczycki, and Adam Nowak. Gradient estimates for harmonic and  $q$ -harmonic functions of symmetric stable processes. *Illinois J. Math.*, 46(2):541–556, 2002.
- [33] Krzysztof Bogdan, Andrzej Stós, and Paweł Sztonyk. Harnack inequality for symmetric stable processes on fractals. *C. R. Math. Acad. Sci. Paris*, 335(1):59–63, 2002.
- [34] M. Bogdan, K. Bogdan, and A. Futschik. A data driven smooth test for circular uniformity. *Ann. Inst. Statist. Math.*, 54(1):29–44, 2002.
- [35] Krzysztof Bogdan and Tomasz Byczkowski. On the Schrödinger operator based on the fractional Laplacian. *Bull. Polish Acad. Sci. Math.*, 49(3):291–301, 2001.

- [36] Krzysztof Bogdan and Tomasz Byczkowski. Potential theory of Schrödinger operator based on fractional Laplacian. *Probab. Math. Statist.*, 20(2, Acta Univ. Wratislav. No. 2256):293–335, 2000.
- [37] Krzysztof Bogdan and Małgorzata Bogdan. On existence of maximum likelihood estimators in exponential families. *Statistics*, 34(2):137–149, 2000.
- [38] Krzysztof Bogdan. Sharp estimates for the Green function in Lipschitz domains. *J. Math. Anal. Appl.*, 243(2):326–337, 2000.
- [39] Krzysztof Bogdan. Representation of  $\alpha$ -harmonic functions in Lipschitz domains. *Hiroshima Math. J.*, 29(2):227–243, 1999.
- [40] Krzysztof Bogdan and Tomasz Byczkowski. Probabilistic proof of boundary Harnack principle for  $\alpha$ -harmonic functions. *Potential Anal.*, 11(2):135–156, 1999.
- [41] Krzysztof Bogdan and Tomasz Byczkowski. Potential theory for the  $\alpha$ -stable Schrödinger operator on bounded Lipschitz domains. *Studia Math.*, 133(1):53–92, 1999.
- [42] Krzysztof Bogdan. The boundary Harnack principle for the fractional Laplacian. *Studia Math.*, 123(1):43–80, 1997.
- [43] Krzysztof Bogdan. On the zeros of functions with finite Dirichlet integral. *Kodai Math. J.*, 19(1):7–16, 1996.
- [44] Krzysztof Bogdan. The atomic decomposition of harmonic functions satisfying certain conditions of integrability. *Internat. J. Math. Math. Sci.*, 18(4):625–640, 1995.