

## CURRICULUM VITAE AND PUBLICATIONS

1a. Personal details				
<b>Full name</b>	<i>Title</i> Prof.	<i>First name</i> André	<i>Second name(s)</i>	<i>Family name</i> Nies
<b>Present position</b>	Professor			
<b>Organisation/Employer</b>	The University of Auckland			
<b>Contact address</b>	School of Computer Science			
	38 Princes Street, CBD			
	Auckland		<b>Post code</b>	1142
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### 1b. Academic qualifications

1998, Habilitation, Universität Heidelberg  
 1992, Ph.D., Universität Heidelberg, graded *summa cum laude*.

### 1c. Professional positions held

2013, Professor, University of Auckland  
 2010, Associate Professor, University of Auckland  
 2002, Senior Lecturer, University of Auckland  
 2000, Associate Professor, University of Chicago  
 1995, Assistant Professor, University of Chicago  
 1994, Visiting Assistant Professorship at UW Madison and Cornell University  
 1993, Postdoctoral position at Universität Heidelberg, Germany

### 1d. Present research/professional speciality

A main topic of my research is the algorithmic and logical aspects of structures from algebra. In particular I am interested in groups, and their descriptions via logic. My background is computability theory as a part of mathematical logic. In the past decade I have mostly connected computability with other areas, such as randomness. Recently I also apply randomness in quantum information theory.

### 1e. Total years research experience:

26

### 1f. Professional distinctions and memberships

**2019** Principal investigator in a full Marsden grant by the Royal Society of New Zealand with three associate investigators (Segal, Tent, and Tomamichel), NZD 550K;  
**2018** Kalman prize for best paper by the New Zealand Mathematical Society, joint with Greenberg and Turetsky, for the paper “Coherent randomness tests and computing the K-trivial sets”, J. Eur. Math. Soc. 18 (2016);  
 Simons visiting professorship to visit Katrin Tent at the University of Münster for two weeks;  
 Annals of Pure and Applied Logic, editor, fourth 3-year term.  
**2017** Research programme “Logic and algorithms in group theory”, Sept - Dec 2018 at the Hausdorff Institute for Mathematics in Germany, with O’Brien and Tent, EUR 325K.  
**2015** Annals of Pure and Applied Logic, editor, third 3-year term.  
**2014** External Hood fellowship by Lions foundation through University of Auckland.  
**2013** Principal investigator in a full Marsden grant, joint with Noam Greenberg, NZD 600K;  
 Bulletin of Symbolic Logic, editor, second 3-year term.

**2012** Annals of Pure and Applied Logic, editor, second 3-year term.  
**2011** Silver medal in Kurt Gödel Research Prize competition (by Templeton foundation);  
 Plenary lecture, Computability, Complexity and Randomness, Cape Town;  
 Organizer of Analysis, Randomness and Applications 2011 (Auckland).  
**2010** Lecture at International Congress of Mathematicians, Hyderabad, India, logic session;  
 Fellow of the Royal Society of New Zealand;  
 Best survey paper award by the Association of Symbolic Logic;  
 Plenary lecture, New Zealand Mathematical Society Annual Meeting, Dunedin;  
 Bulletin of Symbolic Logic, editor, 3-year term.  
**2009** New Zealand Mathematical Society Research Award;  
 Plenary lecture, annual meeting of the Association Symbolic Logic (ASL), Notre Dame, USA;  
 Summer meeting of the ASL, Sofia, Bulgaria, 3-hr plenary lecture series;  
 Ann. of Pure and Applied Logic, editor, 3-year term.  
**2008** Principal investigator in a full Marsden grant, joint with Bakhadyr Khossainov, NZD 415K.  
**2004** Principal investigator in a full Marsden grant, joint with Bakhadyr Khossainov, NZD 300K.  
**1998**, 3-year NSF grant, USD 60K.  
**1995**, 3-year NSF grant, USD 60K.

<b>1g. Total number of peer reviewed publications</b>	J. articles	Books, book chapters, books edited	Conference proceedings	Patents
	89	4	17	0

<b>2a. Research publications and dissemination</b>
Peer reviewed journal articles (since 2000)
<b>Nies, A.</b> and Scholz, V. <i>Martin-Löf random quantum states</i> . Journal of Mathematical Physics 60, 092201 (2019). <b>A</b>
Greenberg, N., Miller, J., and <b>Nies, A.</b> <i>Computing from projections of random points: a dense hierarchy of subideals of the K-trivial degrees</i> . J. Math Logic, to appear. <b>A*</b>
Kechris, A., <b>Nies, A.</b> and Tent, K. <i>The complexity of topological group isomorphism</i> . The Journal of Symbolic Logic 83.3 (2018): 1190-1203. <b>A</b>
Greenberg, N., Melnikov, A., <b>Nies, A.</b> and Turetsky, D. <i>Effectively closed subgroups of the infinite symmetric group</i> . Proceedings of the American Mathematical Society 146.12 (2018): 5421-5435. <b>A</b>
<b>Nies, A.</b> , and Sorbi, A. <i>Calibrating word problems of groups via the complexity of equivalence relations</i> . Mathematical Structures in Computer Science 28.3 (2018): 457-471.
Ben Yaacov, I, Doucha, M., <b>Nies, A.</b> and Tsankov, T. <i>Metric Scott analysis</i> . Advances in Mathematics 318 (2017) 46 – 87 <b>A*</b> .
<b>Nies, A.</b> , and Tent, K. <i>Describing finite groups by short first-order sentences</i> . Israel J. Mathematics 221 (2017), 85-115. <b>A</b>
Bienvenu, L., Greenberg, N., Kucera, A., <b>Nies, A.</b> , Turetsky, D. <i>Coherent randomness tests and computing the K-trivial sets</i> . J. European Math. Society 18 (2016), 773-812. <b>A*</b> Kalman Prize, 2018
Brattka, V., Millers, J., and <b>Nies, A.</b> <i>Randomness and differentiability</i> . Transactions of the Amer. Math. Soc. 368 (2016), 581-605. <b>A*</b>
Bienvenu, L., Downey, R., Merkle, W., and <b>Nies, A.</b> <i>Solovay functions and their applications in algorithmic randomness</i> . J. Computer and System Sciences 81 (2015), 1575–1591.

Biennu, L., Hoelzl, R., Miller, J., and <b>Nies, A.</b> Denjoy, Demuth, and Density. <i>J. Math. Logic</i> 1 (2014) 1450004 (35 pages). <b>A*</b>
Melnikov, A, <b>Nies, A.</b> <i>K-triviality in computable metric spaces.</i> <i>Proc. Amer. Math. Soc.</i> , 141 (2013), no. 8, 2885-2899. <b>A</b>
Greenberg, N., Hirschfeldt, D., <b>Nies, A.</b> <i>Characterizing strong jump traceability via randomness.</i> <i>Advances in Mathematics</i> 231 (3-4), 2252-2293 (2012). <b>A*</b>
<b>Nies, A.</b> <i>Computably enumerable sets below random sets.</i> <i>Ann. Pure Appl. Logic</i> 163 (2012), 1596-1610. <b>A</b>
Barnpalias, G., Miller, J., <b>Nies, A.</b> <i>Randomness notions and partial relativization.</i> <i>Israel J. Mathematics</i> 191 (2012), 791-816. <b>A</b>
Greenberg, N., <b>Nies, A.</b> <i>Benign cost functions and lowness properties.</i> <i>J. Symb. Logic</i> 76 (2011), 289-312. <b>A</b>
Calude, C., <b>Nies, A.</b> , Staiger, L., Stephan, F. <i>Universal recursively enumerable sets of strings.</i> <i>Theoretical Computer Science</i> 412 (2011), 2253-2261. <b>A</b>
Barnpalias, G., <b>Nies, A.</b> <i>Upper bounds on ideals in the computably enumerable Turing degrees.</i> <i>Ann. Pure Appl. Logic</i> 162 (2011), 465-473. <b>A</b>
Hjorth, G. and <b>Nies, A.</b> <i>Borel models and Borel theories.</i> <i>J. Symb. Logic</i> 76 (2011), 461-476. <b>A</b>
<b>Nies, A.</b> <i>Calculus of cost functions.</i> In Mariya Soskova (ed.), <i>The Incomputable</i> (2017), 183-216. Springer.
Kucera, A. and <b>Nies, A.</b> <i>Demuth randomness and computational complexity.</i> <i>Ann. Pure Appl. Logic</i> 162 (2011) 504-513. <b>A</b>
Kjos, Hanssen, B. and <b>Nies, A.</b> and Stephan, F. and Yu, L. <i>Higher Kurtz randomness.</i> <i>Ann. Pure Appl. Logic</i> 161 (2010), no. 10, 1280-1290. <b>A</b>
Figueira, S., Miller, J. and <b>Nies, A.</b> <i>Indifferent sets.</i> <i>J. Logic and Computation</i> 19 (2009), no. 2, 425-443. <b>A</b>
<b>Nies, A.</b> and Semukhin, P. <i>Finite automata presentable abelian groups.</i> <i>Ann. Pure Appl. Logic</i> 161 (2009), 458-467. <b>A</b>
<b>Nies, A.</b> and Thomas, R. <i>Finite automata presentable groups and rings.</i> <i>J. Algebra</i> 320 (2008) 569-585. <b>A*</b>
Figueira, S., <b>Nies, A.</b> , and Stephan, F. <i>Lowness properties and approximations of the jump.</i> <i>Ann. Pure Appl. Logic</i> 152 (2008), 51-66. <b>A</b>
Chong, C., <b>Nies, A.</b> and Yu, L. <i>Higher randomness notions and their lowness properties.</i> <i>Israel J. of Mathematics</i> 166 (2008), 39-60. <b>A</b>
Khoussainov, B., <b>Nies, A.</b> , Rubin, S. and Stephan, F. <i>Automatic Structures: Richness and Limitations.</i> <i>Log. Methods Comput. Sci.</i> 3 (2007), no. 2, 2:2, 18 p. <b>A</b>
<b>Nies, A.</b> <i>Comparing quasi-finitely axiomatizable and prime groups.</i> <i>J. Group Theory</i> 10 (2007), 347-361. <b>B</b>
<b>Nies, A.</b> <i>Describing Groups.</i> <i>Bull. Symb. Logic</i> 13 no 3 (2007), 305-339. <b>A</b>
Hjorth, G. and <b>Nies, A.</b> <i>Randomness via effective descriptive set theory.</i> <i>J. London Math Soc</i> 75 (2), (2007): 495-508. <b>A</b>
<b>Nies, A.</b> <i>Non-cupping and randomness.</i> <i>Proc. Amer. Math. Soc.</i> 135 (2007), no. 3, 837- 844. <b>A</b>
Merkle, W., Miller, J., <b>Nies, A.</b> , Reimann, J. and Stephan, F. <i>Kolmogorov-Loveland randomness and Stochasticity.</i> <i>Ann. Pure Appl. Logic</i> 138 (2006) 183-210. <b>A</b>
Downey, R., <b>Nies, A.</b> , Weber, R. and Yu, L. <i>Lowness and <math>\Pi_2^0</math> Nullsets.</i> <i>J. Symb. Logic</i> 71 (2006), 1044-1052.
Miller, J. and <b>Nies, A.</b> <i>Randomness and computability: Open questions.</i> <i>Bull. Symb. Logic.</i> 12 no. 3 (2006) 390-410. <b>A</b>

Downey, R., Hirschfeldt, D., Nies, A and Terwijn, S. Calibrating randomness. <i>Bull. Symb. Logic.</i> 12 no 3 (2006) 411-491. <b>A</b>
Kjos-Hanssen, B., <b>Nies, A.</b> and Stephan, F. Lowness for the class of Schnorr random sets. <i>SIAM J. Comput.</i> 35 (2005), no. 3, 647–657. <b>A*</b>
Downey, R., Hirschfeldt, D., Miller, J. and <b>Nies, A.</b> Relativizing Chaitin's halting probability. <i>J. of Mathematical Logic</i> , Vol. 5, No. 2 (2005) 167-192. <b>A*</b>
<b>Nies, A.</b> Lowness properties and randomness. <i>Advances in Mathematics</i> 197, Issue 1 (2005), 274-305. <b>A*</b>
<b>Nies, A.</b> , Stephan, F. and Terwijn, S. Randomness, relativization and Turing degrees. <i>J. Symb. Logic</i> 70 no 2 (2005), 515-535. <b>A</b>
Becher, V., Figueira, S., <b>Nies, A.</b> and Picchi, S. Program Size Complexity for Possibly Infinite Computations. <i>Notre Dame J. Formal Logic</i> 46,1 no 1 (2005), 51-64. <b>A</b>
Morozov, A. and <b>Nies, A.</b> Finitely generated groups and first-order logic. <i>J. London Math Soc.</i> 71 no 2 (2005), 545-562. <b>A</b>
Miller, R., <b>Nies, A.</b> and Shore, R. The AE-Theory of R is Undecidable. <i>Trans. Amer. Math. Soc.</i> 356, no. 8 (2004), 3025-3067. <b>A*</b>
<b>Nies, A.</b> Separating classes of groups by first order sentences. <i>Intern. J. of Algebra and Computation</i> 13, No 3 (2003), 287-302. <b>A</b>
<b>Nies, A.</b> Aspects of free groups. <i>J. Algebra</i> 263 (2003), 119-125. <b>A*</b>
Center, D. and <b>Nies, A.</b> Global properties of the lattice of $\Pi_0^1$ -classes. <i>Proc. AMS</i> 132 (1) (2003), 239-249. <b>A</b>
Downey, R., Hirschfeldt, D. and <b>Nies, A.</b> Randomness, computability and density. <i>SIAM J. Computing</i> 31 (2002), 1169-1183. <b>A*</b>
<b>Nies, A.</b> A new spectrum of recursive models. <i>Notre Dame J. Formal Logic</i> 40 (1999), no. 3, 307-314. <b>A</b>
Center, D. and <b>Nies, A.</b> Initial segments of the lattice of classes. <i>J. Symb. Logic</i> , 66 (2001), 1749–1765. <b>A</b>
<b>Nies, A.</b> Interpreting N in the computably enumerable weak truth table degrees. <i>Ann. Pure Appl. Logic</i> 107 (2001), no. 1-3, 35–48. <b>A</b>
<b>Nies, A.</b> , and Sorbi, A. Structural properties and enumeration degrees. <i>J. Symb. Logic.</i> 65 no. 1 (2000), 285-293. <b>A</b>
<b>Nies, A.</b> Effectively dense Boolean algebras and their applications. <i>Trans. Amer. Math. Soc.</i> 352, no. 11 (2000), 4989-5012. <b>A*</b>
<b>Nies, A.</b> , and Sorbi, A. Branching in the enumeration degrees of $\Sigma_0^2$ sets. <i>Israel J. Math.</i> 110 (1999), 29-59. <b>A</b>
Peer reviewed books, book chapters, books edited
<b>Nies, A.</b> <i>Computability and Randomness.</i> Oxford University Press (2009), xv + 433 pages. Reviewed version in paperback (2012).
Khoussainov, B., Dinneen, M., and <b>Nies, A.</b> (eds.) <i>Computation, Physics and Beyond.</i> Lecture Notes in Computer Science, (2012), Volume 7160.
<b>Nies, A.</b> Studying randomness through computation. In: H.Zenil, editor, <i>Randomness through computation</i> , World Scientific (2011), 207-223.
Refereed conference proceedings (selection)
<b>Nies, A.</b> and Stephan, F. Closure of resource-bounded randomness notions under polynomial time permutations. STACS 2018: 51:1-51:10. Caen, France.
Monin, B. and <b>Nies, A.</b> A unifying approach to the Gamma question. Proceedings of the International Symposium on Logic in Computer Science (LICS) 2015, 585-596. <a href="http://dx.doi.org/10.1109/LICS.2015.60">http://dx.doi.org/10.1109/LICS.2015.60</a>

**Nies, A.** Differentiability of polynomial time computable functions. In: E. W. Mayr and N. Portier (Eds.), Proceedings of the 31st International Symposium on Theoretical Aspects of Computer Science (STACS) 2014, 602-613.

Bienvendu, L., Hoelzl, R, Miller, J.S., and **Nies, A.** The Denjoy alternative for computable functions. Symposium on theoretical aspects of computer science (STACS) (2012), 543-554.

Bienvendu, L., Merkle, W., and **Nies, A.** Solovay functions and K-triviality. Symposium on theoretical aspects of computer science (STACS) (2011), Dortmund.

**Nies, A.** *Interactions of computability and randomness.* Proceedings of the International Congress of Mathematicians (S. Ragunathan, ed.) 30-57 (2010).

**Nies, A.** *Superhighness and strong jump traceability.* International Conference on Automata, languages and programming (ICALP) (2009), Rhodes, Greece.