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# Curriculum Vitae

MICHAEL IGNATIEFF SCHWARTZBACH

Born: August 15, 1961 —oOo— Citizenship: Danish

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## Degrees

Cand. Scient.	University of Aarhus (Datalogi)	1984
M.S.	Cornell University (Computer Science)	1986
Ph.D.	Cornell University (Computer Science)	1987

## Appointments

Aug 1984–Jan 1987	Kandidatstipendiat (Graduate Stipend)	University of Aarhus
Feb 1987–Apr 1987	Seniorstipendiat (Postgraduate Stipend)	Danish Research Council
May 1987–May 1991	Adjunkt (Assistant Professor)	University of Aarhus
Jun 1991–Dec 2008	Lektor (Associate Professor)	University of Aarhus
Jan 2009–present	Full Professor	University of Aarhus

## Grants

1992–1993 Member of the DART Project  
sponsored by the Danish Natural Sciences Research Council

1994–1998 Kernel researcher at the BRICS Center  
sponsored by the Danish National Research Foundation

1999–2006 Kernel researcher at the BRICS II Center  
sponsored by the Danish National Research Foundation

2004–2006 “Static Guarantees in Dynamic Web Services”  
sponsored by the Danish Natural Sciences Research Council

2005–2008 “Secure Information Management and Processing” (co-applicant)  
sponsored by the Danish Strategic Research Council

2007–2009 “Formals Models for Computing Systems”  
sponsored by the Danish Natural Sciences Research Council

2007 Google Research Award

## Research Interests

Programming languages: design, implementation, and analysis.  
Applications of monadic second-order logic. Web technology. XML.

## Science Metrics

H-Index: 30 (Harzing PoP)

## Professional Activities

Associate Editor, *Theory and Practice of Object Systems*, 1995-1999  
Editorial Board Member, *IEEE Internet Computing* 2004-2006  
Program Committee Chair, *TAPSOFT/EASE'95*  
Program Committee Member, *OOPSLA'98*  
Program Committee Member, *DSL'99*  
Program Committee Co-Chair, *TACAS 2000*  
Program Committee Vice-Chair, *SAINT 2001*  
Program Committee Member, *WWW10*  
Program Committee Member, *PPDP 2001*  
Program Committee Member, *PASTE'01*  
Program Committee Member, *PLDI'02*  
Program Committee Member, *WWW 2002*  
Program Committee Member, *PLAN-X 2002*  
Program Committee Member, *DBPL 2003*  
Program Committee Member, *POPL 2004*  
Program Committee Chair, *PLAN-X 2004*  
Program Committee Member, *ESOP 2004*  
Program Committee Member, *Workshop on Testing, Analysis and Verification of Web Services 2004*  
Program Committee Member, *Workshop on High-Performance XML Processing 2004*  
Program Committee Member, *CC 2005*  
Program Committee Member, *AIOOL 2005*  
Invited Speaker, *ICDT 2005*  
Program Committee Member, *DBPL 2005*  
Program Committee Member, *PODS 2006*  
General Chair, *PLDI 2006*  
Program Committee Member, *LDTA 2006*  
Program Committee Member, *Workshop on Testing, Analysis and Verification of Web Services 2006*  
Program Committee Member, *MFCS 2006*  
Program Committee Member, *AIT 2006*  
Program Committee Co-Chair, *DBPL 2007*  
Program Committee Member, *LDTA 2007*  
Invited Speaker, *PEPM 2007*  
Program Committee Member, *PLAN-X 2008*  
Program Committee Member, *ECOOP 2008*  
Invited Speaker, *CC 2008*  
Program Committee Member, *SLE 2008*  
Program Committee Co-Chair, *CC 2009*  
External Review Committee Member, *PLDI 2009*  
Student Research Competition Selection Committee, *PLDI 2009*  
Program Committee Member, *PLDI 2010*  
Co-organizer, *Dagstuhl Seminar 207*, 1998.  
Guest Editor with Jens Palsberg, *TAPOS Special Issue on Type Systems*

Guest Editor, *JFP Special Issue on Programming Language Technologies for XML*  
Reviewer for numerous journals and conferences  
PLDI Steering Committee, 2006-2008  
CC Steering Committee, 2008-2010  
Member of the Danish Science Education Board, 1997-1999  
Chairman for Danish External Examiners in Computer Science, 1999-present  
Member of the Danish Natural Science Research Council, 2007-present  
Board Member of the Danish Center for Scientific Computing, 2007-present  
Chairman for the Danish Bibliometric Committee for Computer Science, 2008-2009

## Theses Advised

Nicholas Oxhøj (Cand.Scient. 1992)  
Ebbe Skak Larsen (Cand.Scient. 1992)  
Hosein Askari (Cand.Scient. 1994)  
Ole Ildsgaard Hougaard (Cand.Scient. 1994, Ph.D. 1998)  
Anders Tvedt (Cand.Scient. 1994)  
Kristian Lippert (Cand.Scient. 1994)  
Jørgen Greve (Cand.Scient. 1995)  
Jens Cornelius Olsen (Cand.Scient. 1995)  
Morten Hoffmann Sørensen (Cand.Scient. 1996)  
Ole Jakob Lundager Jensen (Cand.Scient. 1997)  
Michael Edgar Jørgensen (Cand.Scient. 1997)  
Claus Brabrand (Cand.Scient. 1999, Ph.D. 2003)  
Manolis Marinos (Cand.Scient. 1999)  
Morten Værum (Cand.Scient. 1999)  
Henrik Lautrup (Cand.Scient. 1999)  
Jacob Elgaard (Cand.Scient. 1999)  
Anders Bækgaard Sandholm (Ph.D. 2000)  
Tom Pilgård (Cand.Scient. 2000)  
Tejs Bomme (Cand.Scient. 2001)  
Steffen Foldager (Cand.Scient. 2001)  
Niels Damgaard (Ph.D. 2001)  
Anders Møller (Ph.D. 2002)  
Mikkel Ricky Christensen (Cand.Scient. 2002)  
Rasmus Haubro Rohde (Cand.Scient. 2002)  
Ole Friis Østergaard (Cand.Scient. 2002)  
Mikkel Bjerg (Cand.Scient. 2002)  
Mads Vanggaard Jensen (Cand.Scient. 2003)  
Henning Böttger (Cand.Scient. 2004)  
Christian Kirkegaard (Cand.Scient. 2003, Ph.D. 2006)  
Jeppe Ravn-Grove (Cand.Scient. 2004)  
Mads Olesen (Cand.Scient. 2004)  
Aske Simon Christensen (Ph.D. 2006)  
Søren Kuula (Cand.Scient. 2006)  
Michael Ustrup (Cand.Scient. 2006)  
Colin Rosenthal (Cand.It. 2007)  
Erik Søb Sørensen (Cand.Scient. 2007)  
Martin Mortensen (Cand.Scient. 2007)  
Per Graa (Cand.Scient. 2008)  
Jing Wang (Cand.Scient. 2008)  
Andreas Kirkeskov Carlsen (Cand.Scient. 2009)  
Janus Dam Nielsen (Ph.D. 2009)  
Johnni Winther (Ph.D. current)

Jakob Grauenkjær Thomsen (Ph.D. current)

## Thesis

- [01] "A Category Theoretic Analysis of Predicative Type Theory," Ph.D. thesis, Cornell University, 1987. Supervised by Prakash Panangaden and Robert Constable.

## Books

- [02] "Object-Oriented Type Systems," with Jens Palsberg, ISBN 0-471-94128-X, John Wiley & Sons.
- [03] "TAPSOFT'95: Theory and Practice of Software Development," with Peter D. Mosses and Mogens Nielsen (Eds.), LNCS 915, Springer-Verlag.
- [04] "TACAS'00: Tools and Algorithms for the Construction and Analysis of Systems," with Susanne Graf (Eds.), LNCS 1785, Springer-Verlag.
- [05] "An Introduction to XML and Web Technologies," with Anders Møller, ISBN 0-321-26966-7, Addison-Wesley, 2006.
- [06] "PLDI 2006: ACM SIGPLAN Conference on Programming Language Design and Implementation," with Thomas Ball (Eds.), ACM 2006.
- [07] "DBPL 2007: 11th International Symposium on Database Programming Languages," with Marcelo Arenas (Eds.), LNCS 4797, Springer-Verlag.
- [08] "CC 2009: 18th International Conference on Compiler Construction," with Oege de Moor (Eds.), LNCS 5501, Springer-Verlag.

## Journal Papers

- [09] "Recursively Defined Types in Constructive Type Theory," with Prakash Panangaden and Paul Mendler, *Resolution of Equations in Algebraic Structures*, edited by Hassan Aït-Kaci and Maurice Nivat, Academic Press, 1989.
- [10] "Interpretations of Recursive Type Definitions," in *Theoretical Computer Science*, Vol. 106, No. 1: 119-134, Elsevier, 1993; preliminary version presented at CAAP'90.
- [11] "A New Formalism for Relational Algebra," with Kim S. Larsen and Erik M. Schmidt, in *Information Processing Letters*, Vol. 41, No. 3: 163-168, Elsevier, 1992.
- [12] "Safety Analysis versus Type Inference with Partial Types," with Jens Palsberg, in *Information Processing Letters*, Vol. 43, No. 4: 175-180, Elsevier, 1992.
- [13] "Static Typing for Object-Oriented Programming," with Jens Palsberg, in *Science of Computer Programming*, Vol. 23, No. 1: 19-53, Elsevier, 1994.
- [14] "Static Correctness of Hierarchical Procedures," in *Theoretical Computer Science*, Vol. 156, No. 1&2: 177-201, Elsevier, 1996; preliminary version presented at ICALP'90.
- [15] "Efficient Inference of Partial Types," with Dexter Kozen and Jens Palsberg, in *Journal of Computer and System Sciences*, Vol. 49, No. 2: 306-324, Academic Press, 1994; preliminary version presented at FOCS'92.
- [16] "Safety Analysis versus Type Inference," with Jens Palsberg, in *Information and Computation*, Vol. 118, No. 1: 128-141, Academic Press, 1995.

- [17] "Injectivity of Composite Functions," with Kim S. Larsen, in *Journal of Symbolic Computation*, Vol. 17, No. 5: 393-408, Academic Press, 1994.
- [18] "Efficient Recursive Subtyping," with Dexter Kozen and Jens Palsberg, in *Mathematical Structures in Computer Science*, Vol. 5, No. 1: 113-125, Cambridge University Press, 1995; preliminary version presented at POPL'93.
- [19] "Type Inference of SELF: Analysis of Objects with Dynamic and Multiple Inheritance," with Ole Agesen and Jens Palsberg, in *Software Practice & Experience*, Vol. 25, No. 9: 975-995, John Wiley & Sons, 1995; preliminary version presented at ECOOP'93.
- [20] "Type Inference of Turbo Pascal," with Hosein Askari and Ole I. Hougaard, in *Software – Concepts and Tools Vol. 16: 160-169*, Springer-Verlag, 1995.
- [21] "A Domain-Specific Language for Regular Sets of Strings and Trees," with Nils Klarlund, in *IEEE Transactions on Software Engineering*, Vol. 25, No. 3: 378-386, IEEE Computer Society, 1999; preliminary version presented at DSL'97.
- [22] "PowerForms: Declarative Client-Side Form Field Validation," with Claus Brabrand, Anders Møller, and Mikkel Ricky, in *World Wide Web Journal*, Vol. 3, No. 4: 205-214, Baltzer Science Publishers, 2000.
- [23] "MONA Implementation Secrets," with Anders Møller and Nils Klarlund, in *International Journal on Foundations of Computer Science*, Vol. 13, No. 4: 571-586, World Scientific, 2002; preliminary version presented at CIAA'00.
- [24] "DSD: A Schema Language for XML," with Anders Møller and Nils Klarlund, in *Automated Software Engineering*, Vol. 9, No. 3: 285-319, Kluwer Academic Publishers, 2002; preliminary version presented at FMSP'00.
- [25] "The <bigwig> Project," with Anders Møller and Claus Brabrand, in *Transactions on Internet Technology*, Vol. 2, No. 2: 79-114, ACM, 2002.
- [26] "Language-Based Caching of Dynamically Generated HTML," with Claus Brabrand, Anders Møller, and Steffan Olesen, in *World Wide Web Journal*, Vol. 5, No. 4: 305-323, Kluwer Academic Publishers, 2002.
- [27] "Extending Java for High-Level Web Service Construction," with Aske Simon Christensen and Anders Møller, in *Transaction on Programming Languages and Systems*, Vol. 25, No. 6: 814-875, ACM, 2003.
- [28] "Static Analysis of XML Transformations in Java," with Christian Kirkegaard and Anders Møller, in *Transactions on Software Engineering*, Vol. 30, No. 3: 181-192, IEEE, 2004.
- [29] "Contracts for Cooperation between Web Service Programmers and HTML Designers," with Henning Böttger and Anders Møller, in *Journal of Web Engineering*, Vol. 5, No. 1, Rinton Press, 2006.
- [30] "The METAFRONT System: Extensible Parsing and Transformation," with Claus Brabrand, in *Science of Computer Programming*, Vol. 68, No. 1: 2-20, Elsevier, 2007; preliminary version presented at LDTA 2003.
- [31] "Static Validation of XSL Transformations," with Anders Møller and Mads Østerby Olesen, to appear in *Transaction on Programming Languages and Systems*, ACM, 2007.
- [32] "A Singular Choice for Multiple Choice," with Gudmund Frandsen, in *SIGCSE Bulletin Inroads*, Vol 38, No. 4, ACM, 2006.

- [33] “Dual Syntax for XML Languages,” with Claus Brabrand and Anders Møller, to appear in *Information Systems*, Elsevier, 2007; preliminary version presented at *DBPL’05*.
- [34] “XML Graphs in Program Analysis,” with Anders Møller, to appear in *Science of Computer Programming*, Elsevier, 2010.

### Refereed Conference Papers (not appearing above)

- [35] “An Imperative Type Hierarchy with Partial Products,” with Erik M. Schmidt, in *MFCS’89, Proc. 14th Conference on Mathematical Foundations of Computer Science: 458-470*, LNCS 379, Springer-Verlag, 1989.
- [36] “Type Substitution for Object-Oriented Programming,” with Jens Palsberg, in *OOPSLA’90, Proc. 5th Conference on Object-Oriented Programming: Systems, Languages and Applications: 151-160*, ACM, 1990.
- [37] “Type Inference with Inequalities,” in *CAAP’91, Proc. 16th Colloquium on Trees in Algebra and Programming: 441-455*, LNCS 493, Springer-Verlag, 1991.
- [38] “What is Type-Safe Code Reuse?,” with Jens Palsberg, in *ECOOP’91, Proc. 5th European Conference on Object-Oriented Programming: 325-341*, LNCS 512, Springer-Verlag, 1991.
- [39] “Object-Oriented Type Inference,” with Jens Palsberg, in *OOPSLA’91, Proc. 6th Conference on Object-Oriented Programming: Systems, Languages, and Applications: 146-161*, ACM, 1991.
- [40] “Making Type Inference Practical,” with Nicholas Oxhøj and Jens Palsberg, in *ECOOP’92, Proc. 6th European Conference on Object-Oriented Programming: 329-349*, LNCS 615, Springer-Verlag, 1992.
- [41] “Graph Types,” with Nils Klarlund, in *POPL’93, Proc. 20th Annual Symposium on Principles of Programming Languages: 196-205*, ACM, 1993.
- [42] “Graphs and Decidable Transductions based on Edge Constraints,” with Nils Klarlund, in *CAAP’94, Proc. 19th Colloquium on Trees in Algebra and Programming: 187-201*, LNCS 787, Springer-Verlag, 1994.
- [43] “Binding Time Analysis: Abstract Interpretation versus Type Inference,” with Jens Palsberg, in *ICCL’94, Proc. IEEE 1994 International Conference on Computer Languages: 289-298*, IEEE Computer Society Press, 1994.
- [44] “Formal Design Constraints,” with Nils Klarlund and Jari Koistinen, in *OOPSLA’96, Proc. 11th Conference on Object-Oriented Programming: Systems, Languages, and Applications: 370-383*, ACM, 1996.
- [45] “Automatic Verification of Pointer Programs using Monadic Second-Order Logic,” with Jakob L. Jensen, Michael E. Jørgensen, and Nils Klarlund, in *PLDI’97, Proc. Conference on Programming Language Design and Implementation: 226-236*, ACM, 1997.
- [46] “Distributed Safety Controllers for Interactive Web Services,” with Anders Sandholm in *FASE’98, Proc. Conference on Fundamental Approaches to Software Engineering: 270-284*, LNCS 1382, Springer-Verlag, 1998.
- [47] “A Runtime System for Interactive Web Services,” with Claus Brabrand, Anders Møller, and Anders Sandholm in *WWW8, Proc. 8th International World Wide Web Conference*, Elsevier, 1999. Also available as a special issue of *Computer Networks* Vol. 31 No. 11–16: 1391-1401, Elsevier, 1999.

- [48] "YakYak: Parsing with Logical Side Constraints," with Niels Damgaard and Nils Klarlund, in *DLT'99, Proc. 4th International Conference on Developments in Language Theory*: 286-304, World Scientific, 2000.
- [49] "A Type System for Dynamic Web Documents," with Anders Sandholm, in *POPL'00, Proc. 27th Annual Symposium on Principles of Programming Languages*: 290-301, ACM, 2000.
- [50] "Compile-Time Debugging of C Programs Working on Trees," with Jacob Elgaard and Anders Møller, in *ESOP'00, Proc. 9th European Symposium on Programming*: 119-134, LNCS 1782, Springer-Verlag, 2000.
- [51] "The Pointer Assertion Logic Engine," with Anders Møller, in *PLDI'01, Proc. Conference on Programming Language Design and Implementation*: 221-231, ACM, 2001.
- [52] "Static Validation of Dynamically Generated HTML," with Claus Brabrand and Anders Møller, in *PASTE'01, Proc. Workshop on Program Analysis for Software Tools and Engineering*: 38-45, ACM, 2001.
- [53] "Growing Languages with Metamorphic Syntax Macros," with Claus Brabrand, in *PEPM'02, Proc. Workshop on Partial Evaluation and Semantics-Based Program Manipulation*: 31-40, ACM, 2002.
- [54] "Static Analysis for Dynamic XML," with Aske Simon Christensen and Anders Møller, in *PLAN-X 2002, Workshop on Programming Language Technologies for XML*, 2002.
- [55] "Precise Analysis of String Expressions," with Aske Simon Christensen and Anders Møller, in *SAS'03, Proc. 10th Annual International Static Analysis Symposium*: 1-13, LNCS, Springer-Verlag, 2003.
- [56] "A Domain-Specific Programming Language for Secure Multiparty Computation," with Janus Dam Nielsen, in *PLAS 2007, Proc. Workshop on Programming Languages and Analysis for Security*, ACM, 2007.
- [57] "Secure Multiparty Computation Goes Live," with Peter Bøgetoft, Dan Lund Christensen, Ivan Damgaard, Thimas Jakobsen, Mikkel Krøigaard, Janus Dam Nielsen, Jesper Buus Nielsen, Kurt Nielsen, Jakob Pagter, and Tomas Toft, to appear in *FC'09, Proc. Thirteenth International Conference on Financial Cryptography and Data Security*, IFCA, 2009.

### **Invited Papers**

- [58] "The Design Space of Type Checkers for XML Transformation Languages," with Anders Møller, in *ICDT 2005, Proc. 10th International Conference on Database Theory*: 17-36, LNCS 3363, Springer-Verlag, 2005.
- [59] "XML Graphs in Program Analysis," with Anders Møller, in *PEPM 2007, Proc. ACM SIGPLAN Workshop on Partial Evaluation and Program Manipulation*: 1-10, ACM, 2007.
- [60] "Design Choices in A Compiler Course," in *CC 2008, Proc. 17th International Conference on Compiler Construction*: 1-15, LNCS, Springer-Verlag, 2008.

### **Other Papers**

- [61] "Three discussions on object-oriented typing," with Jens Palsberg, in *ACM SIGPLAN OOPS Messenger*, 3(2):31-38, 1992.

- [62] "Types and Automata," with Erik Meineche Schmidt, PB-316, Department of Computer Science, Aarhus University, 1990.

## **Tutorials**

- [63] "Types for the Language Designer," with Jens Palsberg, half-day tutorial at OOP-SLA'92, Conference on Object-Oriented Programming: Systems, Languages, and Applications, Vancouver, Canada, October 1992.
- [64] "Object-Oriented Type Systems," with Jens Palsberg, half-day tutorial at ECOOP'93, European Conference on Object-Oriented Programming, Kaiserslautern, Germany, July 1993.
- [65] "Types for the Language Designer," with Jens Palsberg, half-day tutorial at OOP-SLA'93, Conference on Object-Oriented Programming: Systems, Languages, and Applications, Washington, D.C., October 1993.
- [66] "Developments in Object-Oriented Type Systems," half-day tutorial at POPL'94, 21st Annual Symposium on Principles of Programming Languages, Portland, Oregon, January 1994.
- [67] "Types for the Language Designer," with Jens Palsberg, half-day tutorial at OOP-SLA'95, Conference on Object-Oriented Programming: Systems, Languages, and Applications, Austin, Texas, October 1995.
- [68] "Types for the Language Designer," with Jens Palsberg, half-day tutorial at OOP-SLA'96, Conference on Object-Oriented Programming: Systems, Languages, and Applications, San Jose, California, October 1996.
- [69] "XML Technology," four lectures at the International School for Computer Science Researchers, Lipari, Italy, July 2001.