

# Jan Vondrák

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## Research interests

### Combinatorics and Algorithms.

Recent work includes combinatorial optimization and approximation algorithms. Also interested in probabilistic combinatorics, stochastic optimization and computational complexity.

## Current position

PRINCETON UNIVERSITY, Princeton, NJ.  
Postdoctoral Teaching Fellow, 2006-09.  
Council on Science and Technology & Department of Mathematics.

## Work experience

MICROSOFT RESEARCH, Redmond, WA.  
Postdoctoral position: Theory group, 2005-06.  
  
MATHEMATICAL SCIENCES RESEARCH INSTITUTE, Berkeley, CA.  
Membership: Spring 2005 program in Probability, Algorithms and Statistical Physics.

## Education

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, MA.  
Ph.D. in Applied Mathematics, 2000-05.  
Thesis title: *Probabilistic Methods in Combinatorial and Stochastic Optimization*.  
Advisor: Michel Goemans.

CHARLES UNIVERSITY, Prague, Czech Republic.  
Ph.D. in Computer Science, 1999-2000, completed 2007.  
Thesis title: *Submodularity in Combinatorial Optimization*.  
Advisor: Martin LoebL.

CHARLES UNIVERSITY, Prague, Czech Republic.  
Master's degree in Computer Science, 1995-1999.  
Thesis title: *Implementation and Testing of a New Max-Cut Algorithm*.  
Advisor: Martin LoebL.

CHARLES UNIVERSITY, Prague, Czech Republic.  
Bachelor's degree in Physics, 1992-1995.

## Publications

*Optimal approximation for the Submodular Welfare Problem in the value oracle model* (single author), to appear in 40<sup>th</sup> ACM STOC (2008).

*Maximizing non-monotone submodular functions* (with U. Feige and V. Mirrokni), in 48<sup>th</sup> IEEE FOCS (2007).

*Maximizing a submodular set function subject to a matroid constraint* (with C. Calinescu, C. Chekuri and M. Pál), in 12<sup>th</sup> IPCO (2007), 182-196.

*Approximation algorithms for allocation problems: Improving the factor of  $1 - 1/e$*  (with U. Feige), in 47<sup>th</sup> IEEE FOCS (2006), 667-676.

*How many random edges make a dense hypergraph non-2-colorable?*  
(with B. Sudakov), to appear in *Random Structures and Algorithms* (2007).

*Shortest-path metric approximation for random subgraphs*  
(single author), *Random Structures and Algorithms* 30:1-2 (2007), 95-104.

*Covering minimum spanning trees of random subgraphs*  
(with M. Goemans), *Random Structures and Algorithms*, 29:3, 257-276 (2006);  
conference version in 15<sup>th</sup> ACM-SIAM SODA, 927-934.

*Stochastic covering and adaptivity*  
(with M. Goemans), in *LATIN 2006: Theoretical informatics*, 532-543, LNCS 3887 (2006).

*A Ramsey-type result for the hypercube*  
(with N. Alon, B. Sudakov and R. Radoičić), *Journal of Graph Theory* 53 (2006), 196-208.

*On the diameter of separated point sets with many nearly equal distances*  
(with J. Pach and R. Radoičić), *European Journal of Combinatorics*, 27:8, 1321-1332 (2005).

*Adaptivity and approximation for stochastic packing problems*  
(with B. Dean and M. Goemans), in 16<sup>th</sup> ACM-SIAM SODA, 395-404 (2005).

*Approximating the stochastic knapsack problem: the benefit of adaptivity*  
(with B. Dean and M. Goemans), in 45<sup>th</sup> IEEE FOCS, 208-217 (2004).

*Wide partitions, Latin tableaux and Rota's basis conjecture*  
(with T. Chow, K. Fan and M. Goemans), *Advances in Applied Mathematics*, 31:2, 334-358 (2003).

*Towards a theory of frustrated degeneracy*  
(with M. Loeb), *Discrete Mathematics* 271, 179-193 (2003).

*Optimization via enumeration: a new algorithm for the Max-Cut problem*  
(with M. Loeb and A. Galluccio), *J. of Math. Programming* 90-2A, 273-290 (2001).

*The limit checker number of a graph*  
(with R. Šámal), *Discrete Mathematics* 235, 343-347 (2001).

*New algorithm for the Ising problem: Partition function for finite lattice graphs*  
(with M. Loeb and A. Galluccio), *Physical Review Letters* 84-26, 5924-5927 (2000).

*Visibility representations of complete graphs*  
(with R. Babilon, H. Nyklová and O. Pangrác), *Graph drawing 1999*, 333-340,  
*Lecture Notes in Comp. Sci.*, 1731, Springer, Berlin (1999).

**Submitted papers** *Nearly optimal embeddings of trees*  
(with B. Sudakov)

*Disjoint bases in a polymatroid*  
(with G. Calinescu and C. Chekuri)

*Tight information-theoretic lower bounds for welfare maximization in combinatorial auctions*  
(with V. Mirrokni and M. Schapira)

**Selected presentations** 48<sup>th</sup> IEEE Symposium on Foundations of Computer Science (FOCS), Providence, RI, October 2007:  
*Maximizing non-monotone submodular functions.*

AMS central section meeting, Chicago, IL, October 2007:  
*Nearly optimal embeddings of trees.*

12<sup>th</sup> Conference on Integer Programming and Combinatorial Optimization (IPCO), Ithaca, NY, June 2007:

*Maximizing a submodular set function subject to a matroid constraint.*

47<sup>th</sup> IEEE Symposium on Foundations of Computer Science (FOCS), Berkeley, CA, October 2006:  
*Approximation algorithms for allocation problems: Improving the factor of  $1 - 1/e$ .*

SIAM Conference on Discrete Mathematics, Victoria, BC, Canada, June 2006:  
*2-colorability of randomly perturbed hypergraphs.*

Latin American Theoretical Informatics, Valdivia, Chile, March 2006:  
*Stochastic covering and adaptivity.*

Workshop on probabilistic combinatorics, Banff center, Alberta, Canada, November 2005:  
*2-colorability of randomly perturbed hypergraphs.*

AMS eastern section meeting, Bard College, NY, October 2005:  
*Ramsey subgraphs of the hypercube.*

16<sup>th</sup> ACM-SIAM Symposium on Discrete Algorithms (SODA), Vancouver, BC, January 2005:  
*Adaptivity and approximation for stochastic packing problems.*

Workshop on combinatorial optimization, Bertinoro, Italy, May 2004:  
*Covering minimum spanning trees of random subgraphs.*

15<sup>th</sup> ACM-SIAM Symposium on Discrete Algorithms (SODA), New Orleans, LA, January 2004:  
*Covering minimum spanning trees of random subgraphs.*

5<sup>th</sup> Czechoslovak International Symposium on Combinatorics, Prague, 1998:  
*The limit checker number.*

#### **Fellowships and awards**

Princeton Teaching Fellowship, 2006-09.  
Walter A. Roseblith Fellowship, MIT, 2000-01.  
DIMACS-REU stipend, Rutgers University, 1999.

#### **Teaching experience**

Lecturer (head of the course) in *Calculus and Analytical Geometry*, Princeton, Spring 2007.  
Recitation instructor in *Multivariable Calculus* (prof. Hartley Rogers), MIT, Fall 2004.  
Recitation instructor in *Multivariable Calculus* (prof. Arthur Mattuck), MIT, Fall 2003.  
MIT micro-teaching workshop (prof. Michel Goemans), Fall 2003.  
Teaching assistant in *Probability Theory* (prof. Balint Virág), MIT, Fall 2002.  
Teaching assistant in *Advanced Algorithms* (prof. Michel Goemans), MIT, Fall 2001.  
Recitation instructor in *Discrete Mathematics*, Charles University, Prague, 1999-2000.  
Recitation instructor in *Linear Algebra*, Charles University, Prague, 1998-1999.

#### **Professional Activities**

Referee for an NSA grant proposal in mathematical sciences, 2006.  
Referee for *Random Structures and Algorithms*, 2005-07.  
Referee for *FOCS*, *STOC*, *SODA*, *IPCO* and *APPROX/RANDOM* conferences, 2004-07.  
Referee for *Discrete Mathematics*, 2007.  
Referee for *SIAM Journal of Combinatorics*, 2003.

#### **General Skills**

**Languages:** English, French (passive), German (passive), Russian (passive), Czech (native).  
**Computer skills:** C++, Pascal, Maple, Mathematica and Matlab.