

# Li-Yang Tan

## Curriculum Vitae

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<http://www.cs.wustl.edu/~lt1>

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RESEARCH INTERESTS	Complexity Theory, Learning Theory and Foundations of Cryptography.
EDUCATION	<b>Columbia University</b> , New York, New York USA <span style="float: right;"><b>starting 2008</b></span> Ph.D. student, Department of Computer Science
	<b>Washington University</b> , St Louis, Missouri USA <span style="float: right;"><b>2005 - 2006</b></span> Master of Science in Computer Science. GPA: 4.00
	<b>Washington University</b> , St Louis, Missouri USA <span style="float: right;"><b>2002 - 2006</b></span> Bachelor of Arts in Mathematics, with Honors. GPA: 3.90
THESES	“The Meta-Theory of $\mathcal{Q}_0$ in the Calculus of Inductive Constructions.” <i>Master’s Thesis, Washington University Department of Computer Science and Engineering, May 2006. Technical Report WUCSE-2006-24.</i>
	“Chromatic Symmetric Function of Trees and Stanley’s Question.” <i>Senior Project, Washington University Department of Mathematics, May 2006</i>
	“Combinatorial Calculations in the Grossman-Larson Hopf Algebra.” <i>Senior Project, Washington University Department of Mathematics, May 2006</i>
PUBLICATIONS	“The Algebra of Equality Proofs,” with Aaron Stump. <i>16<sup>th</sup> International Conference on Rewriting Techniques and Applications (RTA 2005)</i>
	“Formalizing the Meta-Theory of $\mathcal{Q}_0$ in Rogue-Sigma-Pi.” <i>17<sup>th</sup> European Summer School in Logic, Language and Information (ESSLLI 2005)</i>
RESEARCH EXPERIENCE	<b>Research in Computational Logic</b> ( <a href="http://cl.cse.wustl.edu">http://cl.cse.wustl.edu</a> )
	<ul style="list-style-type: none"><li>• <b>Formalizing the Meta-Theory of <math>\mathcal{Q}_0</math></b> Complete formalization of the syntactic meta-theory of Peter Andrews’ classical higher-order logic <math>\mathcal{Q}_0</math> in the interactive theorem prover Coq, as well as an experimental language RSP1.</li><li>• <b>The Algebra of Equality Proofs</b> Proved that equivalence between equality proofs is axiomatized by the standard axioms of group theory. Devised a linear time strategy for canonizing equality proofs and analyzed the time complexity of normalization without strategy. Joint work with Aaron Stump.</li></ul>
	<b>Research in Combinatorics</b>
	<ul style="list-style-type: none"><li>• <b>Chromatic Symmetric Functions of Trees</b> Worked on Stanley’s question of whether the chromatic symmetric function is a complete isomorphism invariant for trees. Verified the conjecture to be true for all trees of size at most 23, improving on the prior record of 15.</li><li>• <b>The Jacobian Conjecture as a Problem in Combinatorics</b> Author of a program for combinatorial calculations in the graded free tree quotient modules of the Grossman-Larson Hopf Algebra. The Jacobian Conjecture is shown hold in the cubic symmetric case when <math>JH^4 = 0</math>. Joint work with David Wright and John Shareshian.</li></ul>

**Organizer of Research Seminar in Complexity Theory** Spring 2006  
 Co-organizer of a weekly, semester-long doctoral research seminar on advanced topics in computational complexity theory. 6 enrolled students, 3 auditors.  
 Web: <http://www.cs.wustl.edu/~lt1/complexity-seminar.html>

INTERNATIONAL  
EXPERIENCE

**Budapest Semesters in Mathematics** January - May 2005  
 6-month program in Budapest, Hungary, comprising of classes taught by faculty at the Rényi Institute of Mathematics and Eötvös University. Coursework in Advanced Combinatorics, Topics in Graph Theory, and Set Theory.

**International Summer Schools**

- *P-NP-BPP-PCP*: PhD School on the Modern Theory of Computation, Cortona  
 2-week courses in Probabilistically Checkable Proofs and Approximation Algorithms. One of six foreign applicants awarded fellowship covering all local expenses.
- Summer School on “Proofs of Programs and Formalization of Mathematics,” Göteborg  
 2-week school with lectures on lambda calculus, type theory, logical frameworks, and the use of interactive theorem provers. Awarded fellowship covering all local expenses.
- European Summer School in Logic, Language and Information, Edinburgh  
 Lectures on Intuitionistic Logic, Constraint Logic Programming and Formal Ontology.

TEACHING  
EXPERIENCE

**Teaching Assistant / Course Grader** Fall 2003 - Spring 2006

- Head TA: Algorithms and Data Structures
- TA: Graduate Level Theory of Computation, Algorithms and Data Structures (two 90-minute guest lectures), Introduction to Computer Science I, II
- Grader: Accelerated Calculus I

**Academic Mentor / Group and Personal Tutor** Fall 2003 - Fall 2004  
 Courses mentored include calculus at all levels, linear algebra and differential equations.

HONORS AND  
AWARDS

Elected Phi Beta Kappa, Sigma Xi	Spring 2006
Nominated to 2006 All-USA College Academic Team	Fall 2005
Awarded Mathematical Association of America (MAA) membership	Fall 2005
Fellowship for <i>P-NP-BPP-PCP</i> , summer school in complexity theory	Summer 2005
Fellowship for TYPES, summer school in type theory	Summer 2005
Washington University Dean’s List	Fall 2002 - Spring 2004
Washington University Freshman Writing Award	2002
Singapore Mathematical Olympiad National Training Team	1999
Singapore Mathematical Olympiad Medalist	1999, 2000, and 2001