Lucy Liuxuan Zhang

Address: 171 Huron St., Toronto, ON, M5T 2B6, Canada.

Phone: (647) 886-3961 **Email**: lzhang@physics.utoronto.ca

Birth Date and Place: November 9, 1983 in Guangzhou, China.

Citizenship: Canadian

Education:

2006-2007	Department of Physics, University of Toronto, Canada. Master program: Physics
2003-2006	Department of Mathematics, University of Toronto, Canada. Specialist program: Mathematics and Physics (with Distinction)
2002-2003	Department of Music, McGill University, Quebec, Canada. Major program: Violin Performance
1999-2002	Clarkson Secondary School, Mississauga, Canada.

Publications and Term Papers:

2005	Lucy Liuxuan Zhang and Ue-Li Pen, "Fast n-point correlation functions and three-point lensing application", New Astron. 10 (2005) 569-590
2006	Marcos Curty, Lucy-Liuxuan Zhang, Hoi-Kwong Lo, "Sequential attacks against differential-phase-shift quantum key distribution with weak coherent states", quant-ph/0609094
2005	Lucy Liuxuan Zhang, "Understanding surface quantum error-correcting codes"
2006	Lucy Liuxuan Zhang, "Rotation in multiple-plane lensing with a strong lens"

These articles can be accessed on http://www.physics.utoronto.ca/~lzhang/Research/publication.html

Research Positions:

Summer & Fall 2006	a) Undergraduate research course PHY479Y: theory of cluster-state quantum computation and trapped ion implementation b) Master project: theory of fault-tolerant cluster-state quantum computation Prof. Daniel James, Physics, U of T
Summer 2006	NSERC USRA: representation of the symmetric groups Prof. Joe Repka, Mathematics, U of T
Fall 2005	Undergraduate research course PHY478H: security of differential-phase-shift quantum key distribution Prof. Hoi-Kwong Lo, Physics & ECE, U of T
2003-2005	a) Summer student 2003: developed efficient compressible isothermal MHD code to study turbulence in molecular clouds b) Research assistant under the U of T Work-Study Program 2003-04: developed Message-Passing-Interface version of the code to simultaneously run on 540 CPUs c) NSERC USRA 2004: analyzed energetics and power spectra of high-Mach number astrophysical turbulence, studied implications on star formation rate; learnt about

	astrophysical dynamo
	d) Informal 2004-05: computed decomposed power spectra to understand the nature of turbulence and transitions between modes; studied the theory of MHD turbulence
	Prof. Chris Matzner, Astronomy and Astrophysics, U of T
2001-2002	a) U of T Mentorship Program for high school students: data analysis for gravitational lensing
	b) Summer research assistant 2002: wrote fast library subroutines for N-body simulations using assembly languages
	Prof. Ue-Li Pen, CITA, U of T
Spring 2002	High School Co-op program: microscopy lab assistant
	Xerox Research Centre of Canada, Mississauga

Research Interests:

Quantum computing, quantum information, theoretical physics;
Theoretical cosmology: large-scale structure, gravitational lensing, CMB, early universe;
Plasma physics: magnetohydrodynamics, turbulence, dynamo theory;
Mathematics: mathematical physics, topology, algebra, representation theory

Teaching Experience:

2006-2007	Teaching assistance: tutorial leader for PHY138Y

Computational Skills:

Mastery of Fortran 90 programming language
Ability to implement OpenMP and MPI
Experience with various clusters, including CITA's 540-CPU beowulf cluster McKenzie
Familiarity with visualization softwares, eg. SM and Matlab
Practical knowledge of analytic software, eg. Mathematica and Maple
Working knowledge of C programming language and Itanium64 assembly language

Public Presentations:

Jul. 2006	Talk at CUMC 2006 (Canadian Undergraduate Mathematics Conference): "Attacking a new quantum communication protocol"
Oct. 2005	Talk at CUPC 2005 (Canadian Undergraduate Physics Conference): "USD Attack on Differential Phase Shift QKD"
Aug. 2005	Poster at International Conference on The Origin and Evolution of Cosmic Magnetism: "Simulations of MHD Turbulence in ISM"
Aug. 2005	Poster at Open Questions in Cosmology: the First Billion Years: "Fast Three-point Correlation Function Algorithm for Weak Lensing"
Aug. 2004	Poster at International Conference on Cosmic Rays and Magnetic Fields in Large Scale Structure: "Compressible Magnetohydrodynamic Turbulence in Molecular Clouds"
Mar. 2004	Talk at Toronto Astrophysical Gas Dynamics Group meeting: "MHD turbulence: direct simulations"
Mar. 2004	Talk at University of Toronto Undergraduate Math Seminar:

	"Physics & Astrophysics of Magnetohydrodynamical Turbulence"
Nov. 2003	Talk at CUPC 2003 (Canadian Undergraduate Physics Conference): "Compressible magnetohydrodynamic turbulence in molecular clouds"
Aug. 2003	Talk at National Astronomical Observatories of China: "Fast n-point correlation functions and the application of three-point function on weak lensing"
Jul. 2003	Talk at CUMC 2003 (Canadian Undergraduate Mathematics Conference): "Fast n-point correlation functions"
Jun. 2003	Poster at CASCA 2003: "Fast n-point correlation functions and three-point lensing application"
Jun. 2002	Poster at U of T mentorship program poster session: "Study of weak gravitational lensing effect"

Academic Awards and Honours:

Summer 2006	NSERC Undergraduate Student Research Award, Mathematics, $6000
Summer 2004	NSERC Undergraduate Student Research Award, Astronomy & Astrophysics, $8000
2004	Galois OSOTF Award, $2000
2002	Member of the Chair's Circle of Excellence in the Department of Computer Science, Facult of Arts and Science, University of Toronto
2001-2002	Selected participant in U of T Mentorship Program for high school students
2000-2001, 2001-2002	Invitee to Physics Olympiad Preparation Programme Invitational Weekend Training & Selection Camp (hosted by University of Toronto)
2000-2001, 2001-2002	Winner at International Mathematics Tournament of Towns at Toronto (sponsored by University of Toronto)
2000-2001	Descartes (U of Waterloo OAC math contest): first place at Clarkson, top 3% overall
2000-2001	Euclid (U of Waterloo Gr. 12 math contest): first place at Clarkson, top 4% overall
2000-2001	Fermat (U of Waterloo Gr. 11 math contest): top 1% overall, invitee to Invitational Mathematics Challenge Grade 11
2000-2001	Canadian Open Mathematics Challenge (U of Waterloo math contest): Ontario Central Gold Medalist, top 4% overall
1999-2000	Fermat: School Champion Medal
1999-2000	AMC 12 (American Mathematics Contest 12): top 2% internationally, invitee to AIME (American Invitational Mathematics Examination)
2000	Avogadro Examination (U of Waterloo Gr. 11 chemistry contest): first at Clarkson, top 5% nationally
1999	Municipal Environmental Protection Design Project Competition: I designed a garbage collection and recycling system for classroom and school use which came first in the city of Guangzhou (China); my high school was awarded CAD1000-equivalent grant to implement my design

Selected Extra-curricular Activities:

2006-07	Involvement in local practices for the Putnam (Undergraduate) Mathematics Competition

2005-07	Involvement in local practices for the ACM (Association for Computing Machinery) International Collegiate Programming Contest for Undergraduates
2006-07	Bursary holder in the Opera Scene Study Program at Royal Conservatory of Music: sang the role of Hero in Berlioz's Beatrice et Benedict
2006-07	Student at the National Ballet School, Adult Ballet Program
2006	Gr. 6 Voice with First Class Honours (Royal Conservatory of Music, Toronto)
2006	Performance with the Mississauga Symphony Orchestra as a guest violinist
2006	Performance at the Hart House Orchestra Chamber Music Concert: string quartet & solo voice
2003-04, 05-07	Member of the Hart House Orchestra
2005-06	Student at the Hart House Ballet
2005-06	VP Social of the Math Union at U of T
2000-02, 05-06	Founder and member of string quartets
2002	Member of the McGill Symphony Orchestra
2002	a) First in class for String Quartet (Age 18 & Under) at the Greater Toronto Kiwanis Music Festival b) Second in class for Concerto for Violin and Orchestra (Open) at Peel Music Festival
2001-02	Minister of Finance for the Peel Region Student Presidents' Council
2000-02	Concertmaster of Mississauga Youth Orchestra
2001	Senior scholarship recipient at Mississauga Music Festival (for solo violin)
2001	Recepient of the Robert Heise Memorial Award presented by Mississauga Youth Choir
2001	Member of National Youth Orchestra of Canada as a winner of national audition
1998	Gr. 9 Violin (Guangzhou, China)

Language Proficiencies:

Fluent in English, Mandarin, Cantonese and Italian; basic knowledge of German

Hobbies:

Playing the violin, singing, dancing, making music with people, enjoying classical music, learning languages, biking and tree-climbing