

Christian E. Laing

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WORK EXPERIENCE

New York University, New York, NY

- Postdoctoral Research Associate in the *Department of Chemistry and Courant Institute of Mathematical Sciences*, May 2007-present. Advisor: Tamar Schlick

Florida State University, Tallahassee, FL

- Postdoctoral Research Associate in the *Department of Mathematics*, March-May 2007
Advisor: De Witt Sumners

EDUCATION

Florida State University, Tallahassee, FL

- Ph.D. Biomedical Mathematics (Computational Biology), March 2007
Advisor: De Witt Sumners
Dissertation title “Biomedical applications of shape descriptors”
- M.S. Biomedical Mathematics (Computational Biology), May 2003
- Program for Instructional Excellence (PIE) Teaching Certificate, April 2002

Universidad de Guanajuato, Guanajuato, Gto, México

- B.S. Mathematics, May 2001
Advisor: Jose Carlos Gomez Larrañaga
Thesis title “The fundamental group for links” (El grupo fundamental para enlaces)

RESEARCH INTERESTS

Applications of topology, geometry, and computer science to molecular biology, genetics, and neuroscience

- Geometric Knot Theory
- RNA structure analysis and prediction
- DNA topology and studies on polymer entanglement
- Geometric measures as brain and molecular shape descriptors
- Pattern classification applied to polymer chains and neuroscience

AWARDS

- Recognition as a member of the National System of Researchers (Sistema Nacional de Investigadores SNI) Level 1 by Conacyt, Mexico 2009
- Recognition by the Mexican Educational Foundation of New York for mentoring in Science and Mathematics at the Washington Irving High School of New York City, May 2008
- PMMB Fellowship, May 2005
- Howard Hughes Fellowship, August 2004

- Latin American - Caribbean (LAC) Scholarship, 2002-2007
- CIMAT Undergraduate Fellowship, Guanajuato, Mexico, 1998-2001
- Summer Undergraduate Research Fellowship, Primer Verano de la Investigación del Centro Guanajuato, Mexico 2000

PUBLICATIONS

1. **Laing, C.**, Jung, S., Iqbal, A., and Schlick, T. Tertiary motifs revealed in analyses of higher-order RNA junctions. *Journal of Molecular Biology* **393**(1):67-82; (2009)
2. **Laing, C.**, and Schlick, T. Analysis of four-way junctions in RNA structures. *Journal of Molecular Biology* **390**(3):547-559; (2009)
3. Xin, Y., **Laing, C.**, Leontis, N. B., and Schlick, T. Annotation of tertiary interactions in RNA structures reveals variations and correlations. *RNA* **14**:2465-2477; (2008)
4. Hurdal, M. K., Gutierrez, J. B., **Laing, C.**, Kline, A. D., and Smith, D. A. Geometric invariants for classification of cortical sulci. *Image Processing, ICIP 2008 IEEE International Conference on Imaging Processing* 1156-1159; (2008)
5. **Laing, C.**, and Sumners, D. W. The writhe of oriented polygonal graphs. *Journal of Knot Theory and its Ramifications*. **17**(12):1575-1594; (2008)
6. Hurdal, M. K., Gutierrez, J. B., **Laing, C.**, and Smith, D. A. Shape Analysis for Automated Sulcal Classification and Parcellation of MRI Data. *Journal of Combinatorial Optimization*. **15**(3):257-275. Springer; (2008)
7. Blackstone, T., McGuirk, P., **Laing, C.**, Vazquez, M., Roca, J., and Arsuaga, J. The role of writhe in DNA condensation. Proceedings of International Workshop on Knot Theory for Scientific Objects. *OCAMI Studies* **1**(2):239-250, Osaka Municipal Universities Press; (2007)
8. **Laing, C.**, and Sumners, D. W. Computing the writhe on lattices. *Journal of Physics A: Mathematics and General*. **39**:1-9; (2006)
9. **Laing, C.**, and Bor, G. Extensiones del teorema de Helly. *Primer Verano de la Investigación del Centro, Guanajuato Gto, Mexico*; (2000)

TEACHING EXPERIENCE

- **Lead Instructor, Florida State University, Tallahassee, FL**, May 2003- December 2006
Calculus I, Calculus III, Biocalculus Lab, and Trigonometry
- **Teaching Assistant, Florida State University, Tallahassee, FL**, August 2001 – April 2003
Liberal Arts Mathematics, College Algebra, Trigonometry, and Practical Finite Mathematics

SERVICE TO THE PROFESSION AND SOCIETY

- **Associate Faculty Member of the Faculty of 1000 Biology**
Periodically review and rate relevant scientific publications
- **Member of the RNA Ontology Consortium (ROC)**
Contribute to create an integrated conceptual framework in the field of RNA
- **Referee for the following journals:**
Bioinformatics, Journal of Molecular Biology, Biophysical Journal, Journal of the American Chemical Society, and BioSystems
- **Science and Mathematics Tutor, Washington Irving High School, New York City, NY, June 2007- May 2008**
Mentored High School students in Science and Mathematics and help them to apply for college

SCIENTIFIC PRESENTATIONS

- DNA Topology Course. **Invited speaker** for three lectures. Okinawa Institute of Science and Technology (**OIST**), Okinawa, **Japan**, November 2-6, 2009
- Postdoctoral Seminar. Annotated tertiary interactions in RNA structures reveal motif correlations and novel interactions. **NYU Medical Center**, March 9, 2009
- Computer Science Seminar. Annotated tertiary interactions in RNA structures reveal motif correlations and novel interactions. New Jersey Institute of Technology (**NJIT**), February 4, 2009
- **IMA** Workshop in Protein Folding. *Annotated tertiary interactions in RNA structures reveal new interactions, correlations in motifs and composite motifs*. Minneapolis, MN. January 16, 2008
- 113th **AMS** Joint Meeting. From RNA Molecules to Brain Structures: Geometric Measures as Shape Descriptors. New Orleans, LA. January 8, 2007
- 113th **AMS** Joint Meeting. Geometric Measures as Brain Shape Descriptors. New Orleans, LA. January 6, 2007
- **New York University**, Chemistry Department. Geometric Measures as RNA Shape Descriptors. New York, NY. November 30, 2006
- **First Joint CMS/SMM Meeting**. Geometric Measures as Brain Shape Descriptors. CIMAT, Guanajuato, Mexico. September 23, 2006
- Introductory Workshop on Computational Applications of Algebraic Topology, **MSRI Berkeley**. Writhe invariants as RNA shape descriptors. Berkeley, CA. September 8, 2006
- Biomedical Math Seminar **San Francisco State University**: Geometric Measures as RNA shape descriptors. San Francisco, CA. September 7, 2006
- **International Conference on Combinatorial Geometry, Topology and Optimization; BoltzanskiFest**. The writhe of polygonal open curves. CIMAT, Guanajuato, **Mexico**. September 1, 2005
- **III International Joint Meeting Japan-Mexico**. The writhe on lattices, Oaxaca, **Mexico**, December 6, 2004

POSTERS

1. Laing, C., Jung, S., Iqbal, A., and Schlick, T. Structural similarity revealed in analyses of RNA junctions. *The Laufer Center for Computational Biology and Genome Sciences*, Inaugural Symposium at **Stony Brook University** (2009)
2. Jung, S., Laing, C., Iqbal, A., and Schlick, T. Tertiary interaction motifs in RNA structures. *Prospective students' day, Chemistry Department, New York University* (2009)
3. Laing, C., Xin, Y., and Schlick, T. Annotated tertiary interaction motifs in RNA structures. Workshop: *RNA in Biology, Bioengineering and Nanotechnology*, **Institute of Mathematics and Its Applications**, University of Minnesota (2007)
4. Laing, C., Gutierrez, J. B., Smith, D. A., Sumners, D. W., and Hurdal, M. K. Automatic sulcal classification using geometric shape descriptors. IPAM Random Shapes Workshop IV: *Image Processing for Random Shapes, Applications to Brain Mapping, Geophysics and Astrophysics*, **Institute for Pure and Applied Mathematics**, University of California Los Angeles (2007)
5. Gutierrez, J. B., Laing, C., Smith, D. A., Kline, A. D., and Hurdal, M. K. The Use of Gauss Integrals as Geometric Shape Descriptors for Brain Pattern Classification. *Summer Program on the Geometry and Statistics of Shape Spaces*, **Statistical and Applied Mathematical Sciences Institute** (2007)
6. Gutierrez, J. B., Laing, C., and Hurdal, M. K. Bio-Structural Classification Database. *Summer Program on the Geometry and Statistics of Shape Spaces*, **Statistical and Applied Mathematical Sciences Institute** (2007)

COMPUTATIONAL SKILLS

- Visual Studio .NET
- C/C++
- SQL
- Java
- Java Script
- Maple
- Matlab
- Scilab
- Unix/Linux
- Mac
- Windows/PC
- HTML/Dreamweaver
- TEX
- Microsoft Office
- Knowledge of Hardware

PROFESSIONAL AFFILIATIONS

- New York Academy of Sciences
- Member of the RNA Ontology Consortium (ROC)
- American Mathematical Society (AMS)
- Society for Industrial and Applied Mathematics (SIAM)
- Phi Mu Epsilon Mathematical Society
- Nature Networks

PROFESSIONAL DEVELOPMENT

- Inaugural Symposium at the Laufer Center for Computational Biology and Genome Sciences, Stony Brook University, September 25, 2009
- 5th Annual RNA Ontology Consortium (ROC) Meeting, Madison Wisconsin, May 25-26, 2009
- 4th Annual RNA Ontology Consortium (ROC) Meeting, Berlin Germany, July 27-28, 2008
- IMA Workshop in Protein Folding, Minneapolis, January 16, 2008
- IMA Workshop in RNA, Bioengineering and Nanotechnology, Minneapolis, October 29-November 2, 2007
- IMA Workshop in Mathematics of DNA Structure, Function, and Interactions, Minneapolis, September 15-21, 2007
- 113th AMS Joint Meeting, New Orleans, January, 2007
- First Joint CMS/SMM Meeting, Guanajuato, Mexico, September 21-23, 2006
- Introductory Workshop on Computational Applications of Algebraic Topology, MSRI Berkeley, September 5-8, 2006
- International Conference in Combinatorial Geometry BoltianskiiFest, Guanajuato, Mexico, 2005
- III International Joint Meeting Japan-Mexico in Topology and its Applications, Oaxaca, Mexico, 2004
- Knots in Vancouver at PIMS, University of British Columbia, Canada, 2004
- BioMaPS/DIMACS/MBBC/PMMB Short Course: Transcriptional Regulation from Molecules to Systems and Beyond, Rutgers University, 2004
- Seminar on Topology Applied to Biology, University of Florida, 2002
- VII Escuela de Verano, CIMAT, Mexico, 2000
- XXXII Congreso de la Sociedad Matemática Mexicana, 1999
- VI Escuela de Verano, CIMAT, Mexico, 1999
- III Encuentro de Geometría Diferencial IMATE-CIMAT, México, 1999
- XXXI Congreso de la Sociedad Matemática Mexicana, 1998
- V Escuela de Verano, CIMAT, Mexico, 1998
- XXX Congreso de la Sociedad Matemática Mexicana, 1997