Louis Theran

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Education

Ph.D. Computer Science, University of Massachusetts, Amherst, Sept. 2010.

Dissertation: *Problems in generic combinatorial rigidity: sparsity, sliders, and emergence of components*

Advisor: Ileana Streinu

M.S. Computer Science, University of Massachusetts, Amherst, Sept. 2007.

B.S. Computer Science and Mathematics, University of Massachusetts, Amherst, Feb. 2006.

Honors: *Cum Laude*

Research Interests

Combinatorial and Computational Geometry, Combinatorial Rigidity, Algorithms, Graph theory, Matroids, Combinatorics

Research Experience

Temple University

Research Assistant Professor, 2009–present.

University of Massachusetts, Amherst

Research Assistant, Ileana Streinu, 2004–2009.

Research Assistant, Micah Adler, 2002–2004.

SolidWorks

Research Intern, SolidWorks, Summer 2008.

Publications

Journal Papers

Natural realizations of sparsity matroids.
(with Ileana Streinu)
Ars Mathematica Contemporanea, **4**(1). 2011.

Slider-pinning rigidity: a Maxwell-Laman-type theorem.
(with Ileana Streinu)
Discrete and Computational Geometry, **44**(4):812–837, 2010.

Sparsity-certifying graph decompositions.
(with Ileana Streinu)
Graphs and Combinatorics, **25**:1–20 2009.

Sparse hypergraphs and pebble game algorithms.
(with Ileana Streinu)
European Journal of Combinatorics, **30**(8):1944–1964, 2009.

Graded sparse graphs and matroids.
(with Audrey Lee and Ileana Streinu)
Journal of Universal Computer Science, **13**(10):1671–1679. 2007.

Characterizing Sparse Graphs by Map Decompositions.
(with Ruth Haas, Audrey Lee, and Ileana Streinu)
Journal of Combinatorial Mathematics and Combinatorial Computing, **62**:3–11. 2007.

Conference Papers

The rigidity transition in random graphs.
(with Shiva Kasiviswanathan and Cris Moore)
to appear in the Proc. of SODA'11. 2011.

Rigid components of random graphs.
CCCG '09: Proceedings of the 21st Canadian Conference on Computational Geometry. Vancouver. 2009.

Combinatorial Genericity and Minimal Rigidity.
(with Ileana Streinu)
SCG '08: Proceedings of the twenty-fourth annual Symposium on Computational Geometry, pages 365–374, ACM, College Park, MD, USA, 2008.

The slider-pinning problem.
(with Audrey Lee and Ileana Streinu)
CCCG '07: Proceedings of the 19th Canadian Conference on Computational Geometry. Ottawa. 2007.

Finding and Maintaining Rigid Components.
(with Audrey Lee and Ileana Streinu)
CCCG '05: Proceedings of the 17th Canadian Conference on Computational Geometry. Windsor. 2005.

Preprints and manuscripts

Generic rigidity of frameworks with crystallographic symmetry.
(with Justin Malestein)
Submitted. 2010.

Lines induced by bichromatic point sets.
Manuscript. 2010.

Searching in dynamic tree-like partial orders.
(with Brent Heeringa and Marius Catalin Iordan)
Submitted. 2010. arxiv: 1010.1316

Topological designs
(with Justin Malestein and Igor Rivin)
Preprint. 2010. arxiv: 1008.3710

Generic combinatorial rigidity of periodic frameworks.
(with Justin Malestein)
Submitted. 2010. arxiv: 1008.1837

Posters and videos

Analyzing rigidity with pebble games (video).
(with Audrey Lee and Ileana Streinu)
SCG '08: Proceedings of the twenty-fourth annual Symposium on Computational Geometry, pages 226–227, ACM, College Park, MD, USA, 2008.

Analyzing Rigidity with Pebble Games (poster).
(with Audrey Lee)
Proc. of the 17th Fall Workshop on Computational Geometry, 2007. (**Best poster award**.)

Software

PolyProj: exact projections of rational polytopes
(with Dave Futer)

PyCUDA: Transparent bindings for GPGPU-optimized LAPACK
(with Garrett Wright)
`http://math.temple.edu/research/geometry/PyCULA`

Talks

Refereed conference talks

The rigidity transition in random graphs. SODA '11, Jan. 2011.

Rigid components of random graphs. CCCG '09, Aug. 2009.

Combinatorial genericity and minimal rigidity. SCG '08, Jun. 9–11, 2008.

The slider-pinning problem. CCCG '07, Aug. 20–22, 2007.

Invited seminar talks

Combinatorics and Probability Seminar, University of Pennsylvania.

Geometry-Topology Seminar, University of Maryland.

Geometry-Topology Seminar, University of Pennsylvania.

Geometry-Topology Seminar, Temple University.

Theory seminar, University of Massachusetts, Amherst.

Theory seminar, KAIST.

Programs attended

Pre-doc course, *Optimization Methods in Discrete Geometry*, TU-Berlin, Apr.–Jun., 2006.

NSF/KOSEF *East Asia and Pacific Summer Institutes*, KAIST, Jun.–Aug. 2006. (**NSF award: OISE-0611980**)

Teaching

Temple University

Courses

Instructor, **Graph Theory**. Spring 2011. (Graduate elective in Math.)

Instructor, **Algorithms**. Fall 2010. (Graduate elective in Math, core course in CIS.)

Instructor, **Senior seminar: discrete and computational geometry**. Spring 2010. (Required course for undergraduate math majors. Nominated for a *Distinguished Teaching in the discipline by an NTT faculty member* award.)

Instructor, **Combinatorics**. Fall 2009. (Undergraduate elective.)

Students advised

Undergraduate thesis advisor (Bryn Mawr)
Student: Olivia Coplan, Bryn Mawr '11
Project: **Checking connectivity of hypothetical zeolites.**

Undergraduate research mentor. Summer 2010.
Student: Garrett Wright, Temple senior.
Project: **GPGPU-optimized sparse linear algebra**

Undergraduate research mentor. Summer 2010.
Student: Olivia Coplan, Bryn Mawr rising senior.
Project **Checking connectivity of hypothetical zeolites.**

University of Massachusetts, Amherst

Teaching Assistant, Operating Systems, Fall 2004.

Grader, Advanced Algorithms, 2003–2004.

Grader, Programming Language Paradigms, 2002–2003.

Service

Refereeing

Referee for *ACM Transactions on Sensor Networks*.

Referee for *Geom. Dedicata*.

Referee for *Computational Geometry: Theory and applications*.

Additional referee for *Discrete and Computational Geometry*.

Additional referee for *European Journal of Combinatorics*.

Additional referee for *SCG '09*.

Additional referee for *ISAAC '08*.

Additional referee for *FWCG '07*.

Additional referee for *SCG '07*.

Conferences and workshops

Local organization (web site) for *FWCG '07*.

Local organization for *FWCG '06*.

Departmental service

Graduate Student Representative, Department of Computer Science, University of Massachusetts, Amherst. 2007–2008.

Department Steward, Graduate Employee Organization, University of Massachusetts, Amherst. 2006.