

Vu Khac Ky

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Education

- Dec 2012-Jul 2016 **Ph.D.** in Theoretical Computer Science, **Ecole Polytechnique**, France.
- Oct 2010-Dec 2012 **M.Sc.** in Applied Mathematics, Kaiserslautern University, Germany.
- Sep 2009-Oct 2010 **International M.Sc.** in Mathematics, Institute of Mathematics, Vietnam.
- Sep 2005-Sep 2009 **B.Sc.** in Mathematics, National University of Vietnam (**honors program**).

Awards and Distinctions

- 2012-2015 **Microsoft Research PhD Scholarship** (the only student in France in 2012).
- 2011-2012 **International Scholarship**, TU Kaiserslautern (Germany).
- 2010-2011 **Government Scholarship** (Vietnam).
- 2007 **First prize** in National Mathematical Olympiad for Students (Vietnam).
- 2006 **Third prize** in National Mathematical Olympiad for Students (Vietnam).
- 2005 **Second prize** in National Mathematical Olympiad for High-school Students (Vietnam).

Works and Projects

- Nov 2016- now **Postdoctoral Associate** (**CUHK** - Chinese University of Hong Kong)
 - to generalize *random projection* techniques to Quadratic Programming, Distance Geometry and Formally-real Jordan algebra.
 - to work on some open problems in *Information Theory*, such as a conjecture regarding optimality of the dictator function under Hellinger distance.
- 2013-Aug 2016 **Research Assistant** (Laboratoire d'informatique (LIX), **Ecole Polytechnique**)
 - to devise methods based on *random projection* techniques to reduce data dimension and apply them to a number of important optimization problems such as Linear Programming, Euclidean Membership, Derivative-free Optimization,...
- Dec 2012-2013 **SmartBuilding project** (funded by **Microsoft Research**, Cambridge, UK)
 - to devise methods for minimizing energy consumptions in smart-buildings. Energy consumption can not be written as a mathematical function, but is evaluated by a complicated simulation process. Therefore, this problem is studied in the framework of a more general *simulation-based* or *black-box optimization*.
- 2009-2012 **Flyspeck project** (funded by **National Science Foundation (NSF)**, USA):
 - to use automated verification softwares (Ocaml and HOL) to produce a formal proof (the proof in which the correctness of each step is checked by computers) of the Kepler conjecture. The project, completed in 2015, is *one of the largest projects* in formal mathematics.

Languages and Computer Skills

Vietnamese: mother tongue.
English: fluent.

Programming languages: Python, Matlab, C++.
Formal verification: HOL.

Publications

- 2017
13. Ky Vu, Pierre-Louis Poirion, Leo Liberti: **Fast approximate solution of large dense linear programs**, *Preprint* (2017).
12. Leo Liberti, Ky Vu: **Barvinok's naive algorithm in Distance Geometry**, *Operations Research Letters* Volume 46, Issue 5, 2018.
11. Ky Vu: **Random projections for high-dimensional optimization problems**, *4OR - A Quarterly Journal of Operations Research*, 15(3) April 2017.
- 2016
10. Ky Vu, Pierre-Louis Poirion, Leo Liberti: **On an optimal constraint aggregation method for integer programming and on an analytic expression of the number of integer points in a polytope**, *Preprint* (2016).
9. Ky Vu, Pierre-Louis Poirion, Leo Liberti: **Random Projections for Linear Programming**, *Mathematics of Operations Research*, (2018).
8. Ky Vu, Claudia D'Ambrosio, Pierre-Louis Poirion, Leo Liberti: **Random projections for trust-region subproblems with applications to derivative-free optimization**, *Preprint* (2016).
- 2015
7. Ky Vu: **Randomized sketches for linear systems with convex constraints**, *Preprint* (2017).
6. Ky Vu, Pierre-Louis Poirion, Leo Liberti: **Using the Johnson-Lindenstrauss lemma in linear and integer programming**, *Preprint arxiv:1507.00990*, 2015.
5. Ky Vu, Pierre-Louis Poirion, Leo Liberti: **Gaussian random projections for membership problems**, 2016, (to appear in *Discrete Applied Mathematics*.)
4. Ky Vu, Claudia D'Ambrosio, Youssef Hamadi, Leo Liberti: **Surrogate-based methods for black-box optimization**, *International Transactions in Operational Research*, 24(3): 393-424 (2017).
3. Claudia D'Ambrosio, Ky Vu, Carlile Lavor, Leo Liberti, Nelson Maculan: **New error measures and methods for realizing protein graphs from distance data**, *Discrete and Computational Geometry*, 57(2): 371-418 (2017).
- 2014
2. Thomas Hales, Mark Adams, Gertrud Bauer, Dat Tat Dang, John Harrison, Truong Le Hoang, Cezary Kaliszyk, Victor Magron, Sean McLaughlin, Thang Tat Nguyen, Truong Quang Nguyen, Tobias Nipkow, Steven Obua, Joseph Pleso, Jason Rute, Alexey Solovyev, An Hoai Thi Ta, Trung Nam Tran, Diep Thi Trieu, Josef Urban, **Ky Vu**, Roland Zumkeller: **A formal proof of the Kepler conjecture**, *Forum of Mathematics, Pi* (2017).
1. Horst Hamacher and Ky Vu: **Representative systems for bi-objective optimization with applications to network flow problems**, *Preprint* 2014.