

# DANIELE GIUSEPPE SPAMPINATO

Dr.Sc. ETH Zurich

@ daniele.spampinato@gmail.com

🔗 dgspampinato.github.io

☎ +1 412 628 1846

📍 Pittsburgh, PA, USA

## RESEARCH EXPERIENCE

Research scientist

📅 August 2019 – Present

Postdoctoral research associate

📅 October 2017 – July 2019

Carnegie Mellon University

SPIRAL team, Electrical and Computer Engineering Department

📍 Pittsburgh, PA, USA

- Research I am currently involved in includes:
  - FFTX: High-performance computing interface and framework for building spectral applications on upcoming exascale systems (US Department of Energy's Exascale Computing Project).
  - Active library development: Code generation to support backend optimization across standard library calls (US Department of Defense's DARPA BRASS Project).
  - Linear algebraic graph processing (in collaboration with the CMU Software Engineering Institute).
- Taking responsibility in operations management for three research projects.
- Actively mentoring (under supervision) five graduate students.
- Summer interns supervision.

Graduate research and teaching assistant

ETH Zurich

Advanced Computing Laboratory, Computer Science Department

📅 August 2011 – August 2017

📍 Zurich, Switzerland

- Investigated automatic fast code generation for small-scale dense linear algebra applications. Lead to the development of the SLin-Gen/LGen program generator. 🔗 📄
- Co-developed an analysis tool for creating performance and roofline plots from measured data on Intel processors. 📄
- Supervision of two M.Sc. theses (N. Kyrtatas, *A Basic Linear Algebra Compiler for Embedded Processors*, 2014; S. Dietiker, *Data-Parallel Non-Deterministic Finite-State Automata for Regular Expression Matching*, 2017) and a bachelor semester project.
- Teaching assistant for the following master- and bachelor-level courses: *How to Write Fast Numerical Code* (Springs 2012–2016), and *Computer science (Math and Physics)* (Falls 2012–2016).

Graduate research and teaching assistant

ETH Zurich

CSElab, Computer Science Department

📅 February 2010 – August 2011

📍 Zurich, Switzerland

- Performance and numerical analysis of multicore/multi-GPU-accelerated simulations of multiphase compressible flows.
- Teaching assistant for the following bachelor-level courses: *Computer science II (Mechanical Engineering)* (Spring 2011), and *Discrete Mathematics* (Spring 2011).

## INTERESTS

*The design, implementation and promotion of domain-specific languages and code generators for high-performance mathematical software.*

## EDUCATION

Ph.D. in Computer Science

ETH Zurich

📅 Aug 2011 – Apr 2017 📍 Zurich, CH

Advisor: Prof. Markus Püschel

M.Sc. in Computer Engineering

Politecnico di Milano

📅 Oct 2006 – Dec 2009 📍 Milan, IT

Advisor: Prof. Paolo Cremonesi  
110/110, Cum Laude

M.Sc. in Computer Science  
(Sivilingeniør)

Norwegian University of Science and Technology

📅 Aug 2007 – Aug 2009 📍 Trondheim, NO

Advisor: Prof. Anne C. Elster

B.Sc. in Computer Engineering

Politecnico di Milano

📅 Oct 2003 – Sep 2006 📍 Milan, IT

110/110, Cum Laude

## SKILLS

Eye for detail Teamwork Advising

Organization & coordination

Public presentations & interactions

C/C++ Python CUDA

Compiler technology DSL design

Polyhedral model Linear algebra

Performance modelling  $\LaTeX$

## PUBLICATIONS

### Theses




- D. G. Spampinato (2017). "A Linear Algebra Compiler for Small Problem Sizes". PhD thesis. ETH Zurich.
- – (2009). "Modeling Communication on Multi-GPU Systems". MSc thesis. Norwegian University of Science and Technology.

### Journal articles

- F. Franchetti, T. M. Low, T. Popovici, R. Veras, D. G. Spampinato, J. Johnson, M. Püschel, J. C. Hoe, and J. M. F. Moura (2018). "SPIRAL: Extreme Performance Portability". In: *Proceedings of the IEEE, special issue on "From High Level Specification to High Performance Code"* 106.11, pp. 1935–1968.
- D. Rossinelli, B. Hejazialhosseini, D. G. Spampinato, and P. Koumoutsakos (2011). "Multicore/Multi-GPU Accelerated Simulations of Multiphase Compressible Flows Using Wavelet Adapted Grids". In: *SIAM Journal of Scientific Computing* 33.2, pp. 512–540.

### Selected peer-reviewed proceedings

- D. G. Spampinato, U. Sridhar, and T. M. Low (2019). "Linear Algebraic Depth-First Search". In: *Workshop on Libraries, Languages and Compilers for Array Programming (ARRAY@PLDI)*, pp. 93–104.
- U. Sridhar, M. Blanco, R. Mayurnath, D. G. Spampinato, T. M. Low, and S. McMillan (2019). "Delta-stepping SSSP: From Vertices and Edges to Graph-BLAS Implementations". In: *International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, pp. 241–250.
- F. Franchetti, D. G. Spampinato, A. Kulkarni, T. Popovici, T. M. Low, M. Fransisch, A. Canning, P. McCorquodale, B. V. Straalen, and P. Colella (2018). "FFTX and SpectralPack: A First Look". In: *High Performance Computing Workshops (HiPCW)*, pp. 18–27.
- T. M. Low, D. G. Spampinato, A. Kutuluru, U. Sridhar, D. T. Popovici, F. Franchetti, and S. McMillan (2018). "Linear Algebraic Formulation of Edge-centric K-truss Algorithms with Adjacency Matrices". In: *High Performance extreme Computing Conference (HPEC)*. **IEEE HPEC 2018 Graph Challenge Finalist**, pp. 1–7.
- D. G. Spampinato, D. Fabregat-Traver, P. Bientinesi, and M. Püschel (2018). "Program Generation for Small-scale Linear Algebra Applications". In: *Code Generation and Optimization (CGO)*, pp. 327–339.
- J. Zhang, D. G. Spampinato, S. McMillan, and F. Franchetti (2018). "Preliminary Exploration of Large-Scale Triangle Counting on Shared-Memory Multicore System". In: *High Performance extreme Computing Conference (HPEC)*. **IEEE HPEC 2018 Graph Challenge Finalist**, pp. 1–6.
- D. G. Spampinato and M. Püschel (2016). "A Basic Linear Algebra Compiler for Structured Matrices". In: *Code Generation and Optimization (CGO)*. **CGO 2016 highest ranked artifact**, pp. 117–127.
- N. Kyrtatas, D. G. Spampinato, and M. Püschel (2015). "A Basic Linear Algebra Compiler for Embedded Processors". In: *Design, Automation and Test in Europe (DATE)*, pp. 1054–1059.
- G. Ofenbeck, R. Steinmann, V. C. Cabezas, D. G. Spampinato, and M. Püschel (2014). "Applying the Roofline Model". In: *International Symposium on Performance Analysis of Systems and Software (ISPASS)*, pp. 76–85.
- D. G. Spampinato and M. Püschel (2014). "A Basic Linear Algebra Compiler". In: *Code Generation and Optimization (CGO)*. **Best paper award nominee**, pp. 23–32.
- D. G. Spampinato and A. C. Elster (2009). "Linear Optimization on Modern GPUs". In: *International Symposium on Parallel Distributed Processing (IPDPS)*, pp. 1–8.

The above references including additional material related to them are available under request. More information can also be found on my Google Scholar , the Advanced Computing Laboratory website , and on the SPIRAL website .

## HONORS & AWARDS

**IEEE HPEC 2018 Graph Challenge Finalist**  
Among five out of 19 accepted submissions.

**CGO 2016 Highest Ranked Artifact**  
One out of 11 accepted artifacts.

**CGO 2014 Best Paper Award Nominee**  
Among 4 out of 29 accepted papers.

**2009 Top Industrial Managers for Europe (T.I.M.E.) Label Certificate**  
In recognition of double-degree M.Sc. at Politecnico di Milano, Italy and NTNU, Norway.

**IBM EMEA 2009 Best Student Recognition**  
Among 80 selected students in the EMEA region.


## LANGUAGES

Italian 

English 

Spanish 

German 

French 

## REFEREES

**Prof. Franz Franchetti**  
@ franzf@ece.cmu.edu  
✉ ECE Department  
Carnegie Mellon University  
Hamerschlag Hall A312  
5000 Forbes Ave  
15213 Pittsburgh, PA – USA

**Prof. Tze Meng Low**  
@ lowt@andrew.cmu.edu  
✉ ECE Department  
Carnegie Mellon University  
Hamerschlag Hall A303  
5000 Forbes Ave  
15213 Pittsburgh, PA – USA

**Prof. Markus Püschel**  
@ pueschel@inf.ethz.ch  
✉ Department of Computer Science  
ETH Zurich, CAB H69.3  
Universitätsstrasse 6  
8092 Zurich – Switzerland