

Faculty of Computer, Communication,  
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## HEATHER MILLER

Citizenship	USA
Research Interests	Programming language support for concurrent and distributed programming; type systems; non-standard uses of types for data-centric programming and big data; language and library design
Education	<p><i>EPFL, Lausanne, Switzerland</i> 2009 – Ph.D. in Computer Science Advisor: Martin Odersky 2011 –</p> <p><i>University of Miami, Coral Gables, FL</i> 2006 – 2009 BSEE in Electrical Engineering, Audio Engineering, <i>with honors</i>, May 2009</p> <p><i>Cooper Union for the Advancement of Science and Art, New York, NY</i> 2004 – 2006</p>
Academic Service	<p><b>Committees:</b> Curry On Prague (co-chair), Scala 2015 (co-chair), ECOOP 2015 organizing committee (sponsorship chair), POPL 2015 AEC, Scala 2014 (co-chair), Scala 2013 (co-chair)</p> <p><b>Reviewer for:</b> ECOOP 2013, Scala 2013</p>
Publications	<p><b>Spores: A Type-Based Foundation for Closures in the Age of Concurrency and Distribution</b> ECOOP 2014 Heather Miller, Philipp Haller, Martin Odersky <i>European Conference on Object Oriented Programming</i></p> <p><b>Functional Programming For All! Scaling a MOOC for Students And Professionals Alike</b> ICSE 2014 Heather Miller, Philipp Haller, Lukas Rytz, Martin Odersky <i>ACM SIGSOFT International Conference on Software Engineering</i></p> <p><b>Instant Pickles: Generating Object-Oriented Pickler Combinators for Fast and Extensible Serialization</b> OOPSLA 2013 Heather Miller, Philipp Haller, Eugene Burmako, Martin Odersky <i>ACM SIGPLAN Conference on Object Oriented Programming, Systems, Languages and Applications</i></p> <p><b>RAY: Integrating Rx and Async for Direct-Style Reactive Streams</b> REM 2013 Philipp Haller, Heather Miller <i>ACM SPLASH Workshop on Reactivity, Events and Modularity</i></p>

### FlowPools: A Lock-Free Deterministic Concurrent Dataflow Abstraction

LCPC 2012

Aleksandar Prokopec, Heather Miller, Tobias Schlatter,  
Philipp Haller, Martin Odersky

*International Workshop on Languages and Compilers for Parallel Computing*

Invited to Revised Selected Papers on the 25th International Workshop on  
Languages and Compilers for Parallel Computing, Lecture Notes in Computer  
Science, Vol. 7760, 2013

### Tools and Frameworks for Big Learning in Scala: Leveraging the Language for High Productivity and Performance

BigLearn 2011

Heather Miller, Philipp Haller, Martin Odersky

*NIPS Workshop on Parallel and Large-Scale Machine Learning*

### Parallelizing Machine Learning – Functionally: A Framework and Abstractions for Parallel Graph Processing

Scala 2011

Philipp Haller, Heather Miller

*Scala Workshop*

### Submitted/In Preparation

#### Function-Passing Style: Typed, Distributed Functional Programming

Heather Miller, Philipp Haller

#### Self-Assembly: Lightweight Language Extension and Datatype Generic Programming, All-in-One!

Heather Miller, Philipp Haller, Bruno C. d. S. Oliveira

#### Improving Human-Compiler Interaction Through Customizable Type Feedback

Hubert Plociniczak, Heather Miller, Martin Odersky

### Selected Tech Reports

#### Spores, Formally

Heather Miller, Philipp Haller

*December 2013*

#### FlowPools: A Lock-Free Deterministic Concurrent Dataflow Abstraction – Proofs

Aleksandar Prokopec, Heather Miller, Philipp Haller

*June 2012*

### Awards

US National Science Foundation Graduate Research Fellowship

2011 – 2014

EPFL Outstanding Teaching Award

2012

EPFL Computer Science Fellowship

2009 – 2010

Most Outstanding Audio Engineering Student, University of Miami

2009

Most Outstanding Eta Kappa Nu Student, University of Miami

2009

Information Technology Scholarship, University of Miami

2006 – 2009

John Farina Family Scholarship, University of Miami

2006 – 2009

Eta Kappa Nu

2008

Tau Beta Pi

2008

SMART US Department of Defense Scholarship Alternate

2007

Cooper Union Full Tuition Scholarship

2004 – 2006

Professional Experience	Research Intern, <i>Databricks, Berkeley, CA, USA</i>	8/2014 – 11/2014
	Supervisor: Matei Zaharia Integrated Scala Pickling, a framework for fast, boilerplate-free, extensible serialization focused on distributed programming (OOPSLA'13) into Spark. Developed new function-passing programming model and framework, can be thought of as a generalization of Spark/MapReduce programming model.	
Teaching Experience	Lecturer, Co-Designer, <i>Reactive Programming &amp; Parallelism</i>	2015
	EPFL Undergraduate course on parallel, distributed, and asynchronous programming (~90 students)	
	Lead, <i>Functional Programming Principles in Scala</i>	2012 – 2014
	Popular Coursera MOOC on functional programming in Scala, with >200,000 participants to date & largest completion rate for a course its size (~19%)	
	<ul style="list-style-type: none"> <li>• Lead teaching staff organizing a team of graduate students, managing content production, designed course exercises with cloud-hosted grading, production of lecture videos, etc</li> <li>• Created extensive course analysis with interactive visualizations; led to a publication at ICSE'14</li> </ul>	
	Instructor, <i>Scala as a Research Tool</i>	2013
Open Source	ECOOP Tutorial	
	Lead Teaching Assistant, <i>Programming Principles</i>	2012
	Required EPFL Undergraduate course on functional and logic programming (~160 students)	
	Teaching Assistant, <i>Programming Principles</i>	2011, 2014
	Required EPFL Undergraduate course on functional and logic programming (~160 students)	
	Scala Programming Language, <i>member of the Scala team</i>	2011 –
	<ul style="list-style-type: none"> <li>• <a href="#">Scala Spores</a> (<a href="#">Scala Improvement Proposal SIP-21</a>), <i>project lead</i> novel type-based abstraction for using closures safely in concurrent and distributed environments</li> <li>• <a href="#">Scala Pickling</a>, <i>project lead</i> novel framework for fast, boilerplate-free, extensible serialization. Adopted by sbt, the most widely-used build tool for Scala. Popular open-source project on GitHub with &gt;480 stars &amp; dozens of contributors</li> <li>• <a href="#">Scala Futures &amp; Promises</a> (<a href="#">Scala Improvement Proposal SIP-14</a>), <i>team member</i> unified non-blocking concurrency substrate for Scala, Akka, Play, and others</li> </ul>	

- [Scala Documentation](#), *creator, writer, lead maintainer*  
a central website for community-driven documentation for the Scala programming language and core libraries
- [Scaladoc](#), *co-maintainer*  
documentation tool for Scala's official API documentation

Selected Talks	<a href="#">Function Passing Style: Typed, Distributed Functional Programming</a> St. Louis, MO, USA. September 19, 2014	<i>Strange Loop 2014</i>
	<a href="#">Spores: A Type-Based Foundation for Closures in the Age of Concurrency and Distribution</a> Uppsala, Sweden. August 1, 2014	<i>ECOOP 2014</i>
	<a href="#">Academese to English: Scala's Type System, Dependent Types and What It Means To You</a> New York, NY, USA. March 1, 2014	<i>NEScala 2014</i>
	<a href="#">Instant Pickles: Generating Object-Oriented Pickler Combinators for Fast and Extensible Serialization</a> Indianapolis, IN, USA. October 30, 2013	<i>OOPSLA 2013</i>
	<a href="#">PL Abstractions for Distributed Programming: Pickle Your Spores!</a> Bloomington, IN, USA. October 25, 2013	<i>Indiana University (invited)</i>
	<a href="#">Spores: Distributable Functions in Scala</a> St. Louis, MO, USA. September 19, 2013	<i>Strange Loop 2013</i>
	<a href="#">Open Issues in Dataflow Programming</a> Montpellier, France. July 1, 2013	<i>LaME 2013 (invited)</i>
	<a href="#">Scala as a Research Tool</a> Montpellier, France. July 1, 2013	<i>ECOOP 2013 Tutorial</i>
	<a href="#">On Pickles &amp; Spores: Improving Scala's Support for Distributed Programming</a> New York, NY, USA. June 12, 2013	<i>ScalaDays 2013</i>
	<a href="#">Futures &amp; Promises in Scala 2.10</a> Philadelphia, PA, USA. April 2, 2013	<i>PhillyETE 2013 (invited)</i>
Selected Broader Service	<a href="#">EPFL Computer Science Faculty Council, PhD Student Representative</a> Members include the dean of the faculty as well as representatives from every branch of the faculty, administrative, PhD, faculty, etc. Quarterly meetings to steer the faculty and introduce new initiatives.	2012 –

**EPFL CS Graduate Student Association, President**

2009 – 2011

Volunteer student organization with a mission to foster a sense of community and collaboration between different research groups in the faculty. Initiatives led/introduced:

- **Research Day:** college-wide showcase of labs' research activities
- **PhD Student Open House:** main recruiting event for CS doctoral program
- **Social Events:** aperós, ski trips, outings

**EPFL CS Graduate Student Mentor**

2010 – 2012

One-on-one mentoring of incoming doctoral students, aided students in integrating into EPFL's research environment and Switzerland as a whole.

**Students  
Supervised**

<b>Louis Bliss, <i>Incremental Picklers for Scala Pickling</i></b>	9/2013 – 1/2014
M.Sc. Level, co-supervision with Philipp Haller	
<b>Thaddée Yann Tyl, <i>Learning Scala Style</i></b>	2/2013 – 6/2013
M.Sc. thesis	
<b>Tobias Schlatter, <i>FlowSeqs: Barrier-Free ParSeqs</i></b>	9/2012 – 1/2013
M.Sc. level, co-supervision w/ Philipp Haller & Aleksandar Prokopec	
<b>Tobias Schlatter, <i>Multi-Lane FlowPools</i></b>	2/2012 – 6/2012
M.Sc. level, co-supervision w/ Philipp Haller & Aleksandar Prokopec	
<b>Pierre Grydbeck, <i>Parallel Machine Learning: An Expectation Maximization Algorithm for Gaussian Mixture Models</i></b>	2/2012 – 6/2012
M.Sc. level, co-supervision with Philipp Haller	
<b>Bruno Studer, <i>Parallel Machine Learning: Collaborative Filtering via Alternating Least Squares</i></b>	2/2012 – 6/2012
B.Sc. level, co-supervision with Philipp Haller	
<b>Stanislav Peshterliev, <i>Parallel Natural Language Processing Algorithms in Scala</i></b>	9/2011 – 1/2012
M.Sc. level, co-supervision with Philipp Haller	
<b>Olivier Blanvillain &amp; Louis Bliss, <i>Parallelization of a Collaborative Filtering Algorithm with Menthor</i></b>	9/2011 – 1/2012
B.Sc. level, co-supervision with Philipp Haller	
<b>Florian Gysin, <i>Improving Parallel Graph Processing Through the Introduction of Parallel Collections</i></b>	9/2011 – 1/2012
M.Sc. level, co-supervision with Philipp Haller	
<b>Georges Discry, <i>Extending the Menthor Framework for Parallel Graph Processing to Distributed Computing</i></b>	2/2011 – 6/2011
M.Sc. level, co-supervision with Philipp Haller	