

Thomas Köehler


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I am a computer science researcher at CNRS in the Inria CAMUS team of the ICube lab of Strasbourg. I am interested in empowering programmers to optimize programs safely, interactively, and across abstraction layers. I did my postdoc in the same team, where I worked with Arthur Charguéraud on interactive source-to-source code optimization in the OptiTrust project (optitrust.inria.fr). I did my PhD at the University of Glasgow, where I worked with Michel Steuwer on high performance code generation via rewriting in the high-level functional Rise language (rise-lang.org).

CURRENT POSITION

2024– | **CNRS Researcher**
INRIA CAMUS, ICube lab, Strasbourg, France

EDUCATION

2018–2022 | **Ph.D in Computer Science**
 3.5 years | University of Glasgow, Scotland, United Kingdom
Supervisors: Michel Steuwer, Phil Trinder

2016–2018 | **Master of Software Science and Technology**
Sorbonne Universités (Université Pierre et Marie Curie), France
Parcours d'Excellence (Excellency Track)

2014–2016 | **Licence of Computer Science (Bachelor)**
Sorbonne Universités (Université Pierre et Marie Curie), France
Mention Bien (High Commendation)

EXPERIENCE

2023–2024 | **Post-Doc: interactive, trustworthy, source-to-source code optimization**
 1.8 years | INRIA CAMUS, ICube lab, Strasbourg, France
Project Leader: Arthur Charguéraud

2020 | **Internship: Compiler and Language Research**
 4 months | Huawei Research and Development, Edinburgh, UK

2018 | **Internship: Efficient object tracking algorithms on heterogeneous and parallel architectures**
 6 months | Laboratoire d'Informatique de Paris 6, France
Supervisors: Lionel Lacassagne, Emmanuel Chailloux

2017 | **Internship: Optical flow computing optimisation on GPU (CUDA)**
 2 months | Laboratoire d'Informatique de Paris 6, France
Supervisor: Lionel Lacassagne

AWARDS












2024, Apr. | **1 of 9 MIT PL Review**, highlighting our POPL 2024 paper

2021, Nov. | **Communications of the ACM Research Highlight**, recognition for our ICFP 2020 paper












2021, Sep. | **1 of 4 ACM SIGPLAN Research Highlight 2020**, awarded to our ICFP 2020 paper

2020 | **HiPEAC Paper Award Winner**, for our ICFP 2020 paper





INTERNATIONAL JOURNAL AND CONFERENCE PUBLICATIONS

- POPL** | **Thomas Koehler**, Andrés Goens, Siddharth Bhat, Tobias Grosser, Phil Trinder, Michel Steuwer:
2024  *Guided Equality Saturation* 
- CACM**  | Bastian Hagedorn, Johannes Lenfers, **Thomas Koehler**, Xueying Qin, Sergei Gorlatch and Michel Steuwer:
2023 *Achieving High-Performance the Functional Way:* 
Expressing High-Performance Optimizations as Rewrite Strategies
- CGO**  | **Thomas Koehler** and Michel Steuwer:
2021 *Towards a Domain-Extensible Compiler: optimizing an image processing pipeline on mobile CPUs* 
- ICFP**  | Bastian Hagedorn, Johannes Lenfers, **Thomas Koehler**, Xueying Qin, Sergei Gorlatch and Michel Steuwer:
2020  *Achieving High-Performance the Functional Way:* 
A Functional Pearl on Expressing High-Performance Optimizations as Rewrite Strategies
- DASIP  | A. Petreto, A. Hennequin, **T. Koehler**, T. Romera, Y. Fargeix, B. Gaillard, M. Bouyer, Q. Meunier and L. Lacassagne:
2018 *Energy and Execution Time Comparison of Optical Flow Algorithms on SIMD and GPU Architectures* 

OTHER PUBLICATIONS

- EGRAPHS  | Rudi Schneider, **Thomas Koehler**, Michel Steuwer:
2024 *Slotted E-Graphs* 
- SOAP  | Guillaume Bertholon, Arthur Charguéraud, **Thomas Koehler**, Begatim Bytyqi, Damien Rouhling:
2024 *Interactive Source-to-Source Optimizations Validated using Static Resource Analysis* 
- JFLA | Guillaume Bertholon, Arthur Charguéraud, **Thomas Koehler**:
2024 *Source-to-Source Optimizations Validated using Separation Logic* 
- arXiv | Jackson Woodruff, **Thomas Koehler**, Alexander Brauckmann, Sam Ainsworth, Michel Steuwer, Michael O'Boyle:
2023 *Rewriting History: Repurposing Domain-Specific CGRAs* 
- ARRAY  | **Thomas Koehler**, Arthur Charguéraud, Begatim Bytyqi, Damien Rouhling, Yann Barsamian:
2023 *OptiTrust: an Interactive Optimization Framework* 
- PhD Thesis | **Thomas Koehler**:
2022 *A Domain-Extensible Compiler with Controllable Automation of Optimisations* 
- arXiv | Michel Steuwer, **Thomas Koehler**, Bastian Köpcke, Federico Pizzuti:
2022 *RISE & Shine: Language-Oriented Compiler Design* 
- arXiv | **Thomas Koehler**, Phil Trinder and Michel Steuwer:
2021 *Sketch-Guided Equality Saturation: Scaling Equality Saturation to Complex Optimizations of Functional Programs* 

COMMUNITY INVOLVEMENT

- Paper Reviews | EGRAPHS'23  and '24  workshops (PC member), ARRAY'22  workshop (PC member), COLA  journal in 2022, IEEE Access  journal in 2024, ICFP'24  conference, IFL'22  symposium (co-reviewing)
- 2024 | Student Research Competition Reviewer at PLDI 2024, Copenhagen, Denmark
- 2022 | Student Volunteer at PLDI 2022, San Diego, CA, US
- 2020-2021 | PhD Mentor, University of Glasgow, UK
- 2020 | Student Volunteer at PLDI 2020, Virtual
- 2019 | Reviewing 2 artifacts for CGO 2020
- 2019-2020 | Intra-Systems Seminar Organizer, University of Glasgow, UK

TALKS

Not including talks presenting accepted papers at the conferences and workshops above, or given to my own lab or project:

- 2024, Jul. | *Towards Safe Interactive Optimization Across Layers*
Inria CASH, Lyon, France
- 2024, Jul. | *Optimisation de Programmes Interactive et Holistique*
Laboratoire Méthodes Formelles, Gif-sur-Yvette, France
- 2024, Mar. | *Guided Equality Saturation*
EGRAPHS Community Meeting, Virtual
- 2023, Mar. | *Interactive Source-to-source Code Optimization with OptiTrust*
Rencontres de la communauté française de compilation, Grenoble, France
- 2023, Jan. | *Introductory Demo: Optimizing Image Blurring with OptiTrust*
Undergraduates Visit (L1), ICube, Strasbourg, France
- 2022, Aug. | *A Term Rewriting Path to High-Performance*
INRIA CAMUS, Strasbourg, France
- 2022, Jul. | *Sketch-Guided Program Optimization*
TUM, Munich, Germany
- 2022, Jun. | **Invited Talk:** *Sketch-Guided Equality Saturation* [↗](#)
EGRAPHS Workshop, PLDI 2022, San Diego, CA, US
- 2022, Apr. | *Sketch-Guided Program Optimisation*
Saarland University, Germany
- 2022, Mar. | *Domain-Extensible Compilers and Controllable Automation of Program Optimizations*
Dagstuhl Seminar (Tensor Computations: Applications and Optimization) [↗](#), Germany
- 2021, Dec. | *Optimizing Processing Pipelines with a Rewrite-Based Domain-Extensible Compiler*
Huawei CSI Paris Seminar, Virtual
- 2021, Nov. | *Optimizing Processing Pipelines with a Rewrite-Based Domain-Extensible Compiler*
Languages, Systems, and Data Seminar, University of California, Santa Cruz, Virtual
- 2021, Jun. | *Optimizing Functional Programs with Equality Saturation*
Scottish Programming Languages Seminar 2021, Virtual

TEACHING

- 2023 | *Seminars + Labs: Algorithms and Programming. Bachelor Level (L1).*
Université de Strasbourg, France
- 2019-2020 | *Lab Assistant: Systems Programming (H). Level 4 (SCQF Level 10)*
Lab Assistant: Programming Languages (H). Level 4 (SCQF Level 10)
University of Glasgow, UK

OPEN-SOURCE CONTRIBUTIONS

- 2014–today | Binding of the Box2D physics engine (Rust) [↗](#)
10k downloads on crates.io [↗](#), 172 commits with 37k additions and 26k deletions
- 2015–2017 | Contribution to GFX-rs, a graphics API (Rust) [↗](#)
680k downloads on crates.io [↗](#), 57 commits with 12k additions and 9k deletions.