# Emanuele D'Osualdo

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## Current position

**Sep 2020–present** **Postdoctoral Researcher**, Foundations of Programming group, *Max Planck Institute for Software Systems*, Saarbrücken, Germany

*Topic* Concurrent Separation Logics, Hyperproperties, Non-Volatile Memory Models, Refinement (with Derek Dreyer)

## Experience

**Sep 2018–Aug 2020** **Marie Curie Research Fellow**, Computing Department, *Imperial College London*, UK

*Topic* Compositional verification and specification for progress and security properties of concurrent software, integrating separation logics, automata theory and process algebra.

*Funding* Two years EU funded fellowship (H2020-MSCA-IF-2017 795218)

**Apr 2017–Sep 2018** **Research Associate**, *Imperial College London*, UK

*Topic* Concurrent Separation Logic (with Philippa Gardner)

**May 2015–Apr 2017** **Postdoctoral Researcher**, *Concurrency Theory Group*, TU Kaiserslautern, Germany

*Topic* Logics and Automata for Infinite State Model Checking (with Prof. Roland Meyer)

## Education

**2010–2015** **PhD in Computer Science**, *University of Oxford*, Merton College, UK

*Thesis* Verification of Message Passing Concurrent Systems (supervisor: Luke Ong)

*Awards* Winner of the 2016 BCS/CPHC Distinguished Dissertation award

**2007–2010** **M.Sc. in Computer Science**, *University of Udine*, Italy, 110/110 *cum laude*

Dissertation on static analysis of Bigraphs by Abstract Interpretation

**2004–2007** **B.Sc. in Computer Science**, *University of Udine*, Italy, 110/110 *cum laude*

Dissertation on Monads and Arrows in Haskell

**Oct 2007–Mar 2008** **Exchange Student (Erasmus)**, *Istanbul Bilgi Universitesi*, Istanbul, Turkey

## Awards & Fellowships

**2018** **Marie Skłodowska-Curie Individual Fellowship**, *EU Horizon 2020*

*Grant Title* Verification and Specification through Progress Abstractions (VeSPA).

*Budget* € 195.454,80 for 2 years (grant number 795218).

**2016** **Winner of the Distinguished Dissertation award**, *BCS/CPHC*, UK

Best British PhD dissertation in Computer Science selected by the Council of Professors and Heads of Computing, and the BCS Academy of Computing.

**2010–2013** **Scatcherd European Scholarship**, *University of Oxford*, UK

University-wide fully-funded PhD scholarship.

**2004–2010** **Scuola Superiore Student Fellowship**, *University of Udine*, Italy

University-wide fully-funded 5 years scholarship for excellent students. Members are annually reviewed and required to attend extra courses. See scuolasuperiore.uniud.it.

## Publications

**OOPSLA'22** **Proving Hypersafety Compositionally**, with *Azadeh Farzan and Derek Dreyer*. Proc. ACM Program. Lang. 6, OOPSLA2. 2022.

**OOPSLA'22** **A Propositions-as-Sessions Interpretation of Bunched Implications in Channel-Based Concurrency**, with *Dan Frumin, Bas van den Heuvel, and Jorge A. Pérez*. Proc. ACM Program. Lang. 6, OOPSLA2. 2022.

**TOPLAS'21** **TaDA Live: Compositional Reasoning for Termination of Fine-grained Concurrent Programs**, with *Julian Sutherland, Azadeh Farzan and Philippa Gardner*. In ACM Transactions on Programming Languages and Systems (TOPLAS). ACM. 2021.

– Presented at POPL'22 (Journal-first submission).

**CONCUR'20** **Decidable Inductive Invariants for Verification of Cryptographic Protocols with Unbounded Sessions**, with *Felix Stutz*. In Proc. of Concurrency Theory. LIPIcs. 2020.

**CSF'17** **Deciding Secrecy of Security Protocols for an Unbounded Number of Sessions: The Case of Depth-bounded Processes**, with *Luke Ong and Alwen Tiu*. In Proc. of Computer Security Foundations. IEEE Computer Society. 2017.

**LICS'16** **First-order Logic with Reachability for Infinite-State Systems**, with *Roland Meyer and Georg Zetzsche*. In Proc. of Symposium on Logic in Computer Science. ACM. 2016.

**ESOP'16** **On Hierarchical Communication Topologies in the $\pi$-calculus**, with *Luke Ong*. In Proc. of European Symposium on Programming. Vol. 9632 of LNCS. Springer. 2016.

**SAS'13** **Automatic Verification of Erlang-Style Concurrency**, with *Jonathan Kochems and Luke Ong*. In Proc. of Static Analysis. Vol. 7935 of LNCS. Springer. 2013.

**AGERE'12** **Soter: an Automatic Safety Verifier for Erlang**, with *Jonathan Kochems and Luke Ong*. In Proceedings of the 2nd edition on Programming systems, languages and applications based on actors, agents, and decentralized control abstractions. ACM. 2012.

**Monograph** **Verification of Message Passing Concurrent Systems**. BCS/CPHC Distinguished Dissertation Award Series, ISBN 978-1-78017-363-4, BCS. 2016.

## Teaching

**2016/2017** **Lecturer** of Concurrency Theory, *TU Kaiserslautern*, Germany

**2016** **Lecturer** of Advanced Automata Theory, *TU Kaiserslautern*, Germany

**May–Jul 2015** **Teaching Assistant**, Concurrency Theory, *TU Kaiserslautern*, Germany

**Jun 2013–Mar 2014** **Tutor** at Merton College, *University of Oxford*, UK

*Subjects* Concurrent Programming, Imperative Programming 2

**2011–2014** **Teaching Assistant**, Dept. of Computer Science, *University of Oxford*, UK

*Subjects* Imperative Programming (Scala), Concurrent Programming (Scala), Functional Programming (Haskell), Concurrency (CSP).

## Student supervision

**2017–2022** Assistant Supervisor of **Julian Sutherland**, PhD in Computer Science, *Imperial College*
*Topic* Compositional Termination Proofs of Fine-grained Concurrent Programs

**2019** **Felix Stutz**, MSc Computer Science, *Saarland University*, Germany
*Topic* Automatic verification of cryptographic protocols through inductive invariants

**2019** **Ruhi Choudhury**, MEng Computing, *Imperial College London*

**2018** **Blaine Rogers**, MEng Joint Mathematics and Computing, *Imperial College London*
*Thesis* A $\pi$-calculus Abstraction for Erlang
– Winner of Davis Prize award (best JMC thesis)

## Invited Talks

**May 2022** Invited Talk at **Iris Worksop 2022**, Radboud University, Nijmegen, The Netherlands.
*Topic* *TaDA Live: Compositional Termination Verification for Concurrent programs*

**May 2019** Talk at **Effective Verification: Static Analysis Meets Program Logics**, Lorentz Center, The Netherlands. Invitation-only research workshop.
*Topic* *Inductive Invariants for Automatic Verification of Cryptographic Protocols*

**Jan 2019** Talk at **Open Problems in Concurrency Theory**, Lisbon, Portugal
Invitation-only research seminar organised by IFIP-WG 1.8 co-located with POPL'19.
*Topic* *Progress for Concurrent Programs*

## Research Talks

### TaDA Live: Compositional Reasoning for Termination of Fine-grained Concurrent Programs

*May 2022* Invited talk at the Iris Workshop, Radboud University Nijmegen, The Netherlands
*Jan 2022* TOPLAS Track at POPL'22, Philadelphia, USA
*Oct 2019* Iris Workshop, Aarhus University, Denmark
*Jul 2019* Surrey Concurrency Workshop and S-REPLS 12, University of Surrey, Guilford, UK
*Jan 2019* Open Problems in Concurrency Theory, POPL'19, Lisbon, Portugal

### Decidable Inductive Invariants for Verification of Cryptographic Protocols

*Jul 2022* RSS Meetups, LASIGE/FCUL, University of Lisbon, Portugal
*Jun 2022* SRM seminar, University of Luxembourg
*Sep 2020* CONCUR 2020, Virtual event
*Sep 2020* iFM$^2$ Meeting, University of Udine, Italy
*Sep 2020* Nobuko Yoshida's group, Imperial College London, UK
*May 2019* Effective Verification Workshop, Leiden, The Netherlands

### Deciding Secrecy of Security Protocols for an Unbounded Number of Sessions

*Sep 2017* Highlights of Logics, Games and Automata, Queen Mary University of London
*Aug 2017* CSF'17, UCSB, Santa Barbara, USA

### First-order Logic with Reachability for Infinite-State Systems

*Jul 2016* LICS'16, Columbia University, New York City, USA

**On Hierarchical Communication Topologies in the $\pi$-calculus**

*May 2018* PLAS Group Seminar, University of Kent, UK
*Oct 2017* Theory Group Seminar, Queen Mary University of London, UK
*Dec 2016* IMDEA Software, hosted by Boris Köpf, Madrid
*Aug 2016* Nanyang Technological University, hosted by Alwen Tiu, Singapore
*Apr 2016* ESOP'16, ETAPS, Eindhoven, Nederlands
*Mar 2016* D-CON'16, Universität des Saarlandes, Saarbrücken, Germany
*Feb 2016* Oxford Advanced Seminar on Informatic Structures, University of Oxford
*Feb 2016* Nobuko Yoshida's group, Imperial College, London

**Precise Abstractions of Concurrent Systems**

*Aug 2014* Hosted by Pawel Sobocinski, University of Southampton

**Automatic Verification of Erlang-Style Concurrency**

*Jun 2013* SAS'13, Seattle, USA
*Jan 2013* Student Short Talk Session at POPL'13, Rome

**Towards Static Analysis for Bigraphical Reactive Systems**

*Oct 2011* Bigraphs Present & Future Workshop, IT University of Copenhagen

## Academic Activities

**Program Committee** Erlang Workshop 2018/2021, EXPRESS/SOS 2019, OOPSLA 2022 (External).

**Organisation** Local organiser for MFPC/CALCO 2019 in London.

**Reviewer**
*Conferences* OOPSLA 2020/2022, ECOOP 2022, CONCUR 2020, LMCS 2020, PLACES 2020, EXPRESS 2019, iFM 2019, ESOP 2019, CAV 2019, SAS 2018, PLDI 2018, CONCUR 2015/2017/2018/2020, ERLANG 2018/2021, FoSSaCS 2017, TACAS 2016, NETYS 2016/2021, MFCS 2012, LICS 2015, FSTTCS 2015, VMCAI 2014, DMC 2014, TAMC 2012, POPL 2012, TLCA 2011.
*Journals* TCS, Information and Computation, Information and Software Technology, Mathematical Structures in Computer Science.
*Artifact Evaluation* OOPSLA 2022, ECOOP 2022.
*Award Committee* POPL Student Research Competition 2021 Selection Committee.

## Research Software

**Lemma9** A tool for automatically checking/inferring invariants of security protocols (with F. Stutz).
*Website* `http://github.com/bordaigorl/lemma9`

**Soter** A proof-of-concept static analyser for Erlang programs (with J. Kochems).
*Demo* `http://soter.emanueledosualdo.com/`

**JamesBound** A proof-of-concept implementation of my ESOP'16 type system for the $\pi$-calculus
*Website* `http://github.com/bordaigorl/jamesbound`
– Includes an Haskell framework for analysing the $\pi$-calculus.

**Stargazer** An innovative, instructional, interactive execution environment for the $\pi$-calculus

*Website* `http://stargazer.emanueledosualdo.com`

- Used as a teaching/presentation aid in my talks and lectures, with excellent student engagement and feedback.
- University of Southern Denmark is using it in lectures.

## Other skills

**Languages** Italian (native speaker) · English (fluent)

**Programming** Haskell, Python, JavaScript, Scala, Java, Erlang.

**Music** Studied violin for more than ten years playing Classical and Jazz Music.
Studied Musical Composition from 2000 to 2005 at the conservatory of Udine.