

# Alexandre Lopes

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## Personal

Birthyear 1987  
Citizenship Portuguese (EU)  
Civil status Married

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## Experience

### Professional

- 01 Apr '18 – present **Key Functional Systems Engineer**, *Carl Zeiss SMT GmbH*, Oberkochen, Germany.
- Optical metrology systems engineering for High-NA EUV free-form mirror metrology (3FM)
  - Creation and maintenance of performance (measurement accuracy/precision) and cycle time roadmaps in strong cooperation with the project technical teams
  - Focus team leader for interferometer software in project task-force
  - Driving software projects, re-scoping and re-structuring in close cooperation with line and project management [matrix]
  - Together with the SE team, technical responsibility for performance, availability and move rate, weighting cost, performance and timing
  - Lateral leadership in very complex and large project, containing a large number of interfaces
  - Bridging system integration to system commissioning
- 01 Jun '17 – 31 Mar '18 **Team Leader and Systems Architect**, *Carl Zeiss SMT GmbH*, Oberkochen, Germany.
- Team leader (Module responsible > 5 FTEs) and architect for High-NA EUV product control systems
  - Team leader (lateral leadership, team of 11 people) and architect for in-house real-time control platform (used in product and for internal qualification processes) including customer [ASML] and supplier interfacing, alignment and procurement
  - Co-responsible for the development and introduction of new Software Development Processes based on the following models/methodologies: Incremental and Iterative, V-Model, Scrum
  - Creation and maintenance of requirements specifications and design specifications
  - Creation and maintenance of project scope statements
  - Taking part in the selection process of new employees
  - Mentoring new employees

15 Nov '16 – 30 May '17 **Systems and Software Architect**, *Carl Zeiss SMT GmbH*, Oberkochen, Germany.

- Work package leader and architect for high-NA EUV control system
- Architect for new control system for high-NA EUV mechatronical qualification
- Setting up the necessary toolchains, hardware, documentation and development environment for ARM Cortex-A and ARM Cortex-M based-development
- ARM Cortex-A and M based software development
- Development of parallel computing image processing for multiSEM (concept and implementation)
- Creation and maintenance of requirements specifications and design specifications
- Creation and maintenance of project scope statements
- Work with international suppliers and customers
- Taking part in the selection process of new employees
- Mentoring new employees

01 Sep '16 – 15 Nov '16 **Embedded Software Architect**, *Robert Bosch Automotive Steering GmbH*, Schwäbisch Gmünd, Germany.

- Embedded software architecture and development for the new ServoTwin steering system platform (commercial vehicles)
- Helped two task forces achieve their goal
- Root cause analysis
- Requirements engineering using Rational DOORS
- Work with Automotive SPICE, MISRA C and Enterprise Architect

12 Jan '15– Present **R&D Engineer, Software Developer, System administrator**, *Carl Zeiss SMT GmbH (outsourced by Personality IT Stuttgart)*, Oberkochen, Germany.

- Software development for the ARM Cortex A9 / Altera Cyclone V SoC (GNU/Linux and baremetal), including first operation of these systems, documentation and creation of a framework for future development
- Implementation of real-time frameworks (based on Xenomai, Preempt-RT, RTAI for ARM and x86)
- GNU/Linux user and kernel space software development
- Mechatronic systems R&D (incl. testing specification, project planning and analysis of opto-electrical measurements [white-light interferometer measurements among other])
- Root cause analysis of opto-mechanical systems
- Development and implementation of software for piezo controllers
- Development and implementation of software for analysis of large sets of optical metrology data
- GNU/Linux (Debian) and Solaris sysadmin
- Work with international suppliers and customers

20 Feb '12 – **System Administrator**, *University of Freiburg*, Freiburg, Germany.

31 Oct '14 Implementation and management of, among other, the following server side solutions:

- Linux, Apache, MySQL, PHP (LAMPS)
- Samba shares
- Wiki (using MediaWiki)

Dec '08 – Apr '10 **Undergraduate's Tutor**, *Escolha Múltipla*, Aveiro, Portugal.

Subjects taught:

- Electromagnetism and Electrodynamics
- Electronics
- Mechanics
- Quantum Mechanics

### Academic

2012 – 2014 **Teaching Assistant**, *University of Freiburg*, Freiburg, Germany.

Subjects:

- Analytical Mechanics (Summer 2014)
- Mechanics (Winter 2013/14)
- Electrodynamics (Winter 2012/13)

01 Nov '10 – **Researcher**, *Theory of Condensed Matter - IMM*, *Radboud University Nijmegen*,  
01 Dez '11 The Netherlands.

- The Self Consistent Screening Approximation in the membrane behavior of graphene.
- Multidimensional integration of ill-behaved integrands using the Lisa Linux cluster from SURFsara in Amsterdam and the following libraries: NAG, Cubature, Cuba

### Voluntary

01 – 15 Aug '07 **Volunteers**, *Instituto Português da Juventude*, Program youth volunteer work for the forest, Oliveirinha, Portugal.

- Volunteer work to help protect the Portuguese forest

22 – 27 Jul '07 **Assistant**, *Summer Academy - Department of Physics*, *University of Aveiro*, Portugal.

- Teaching of experimental holography to high school students

23 – 28 Jul '06 **Assistant**, *Summer Academy - Department of Physics*, *University of Aveiro*, Portugal.

- Teaching of experimental holography to high school students

26 – 30 May '05 **Assistant**, *Associação Juvenil de Ciência*, XI Meeting of Young Researchers, Fundão, Portugal.

- Assistant in the organization of a youth scientific meeting

16 – 20 Apr '04 **Assistant**, *Associação Juvenil de Ciência*, X Meeting of Young Researchers, Aveiro, Portugal.

- Assistant in the organization of a youth scientific meeting

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## Academic Background

20 Feb '12 – **PhD in Theoretical Physics**, *University of Freiburg*, Germany.  
20 Apr. '15

- Thesis title: Pure univariate quantum marginals and electronic transport properties of geometrically frustrated systems
- Advisor: David Gross
- Topics worked on/with:
- Computational complexity theory
- Quantum information theory
- Group theory
- Quantum Chemistry
- Geometrically frustrated systems in condensed matter

15 Sep '08 – **Master in Physics**, *University of Aveiro*, Portugal, *Grade: 18/20 (First Class*  
09 Jul '10 *Honours)*.

- Thesis title: *Electronic, thermodynamic and transport properties of the diamond chain*
- Advisor: R.G. Dias
- Top ranked student

03 Oct '05 – **Bachelor in Physics**, *University of Aveiro*, Portugal, *Grade: 17/20 (First Class*  
24 Nov '08 *Honours)*.

- Thesis title: *Aharonov-Bohm effect and persistent currents in quantum rings*
- Advisor: R.G. Dias
- Best student '08

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## Education and Training

30 Jun – 01 Jul **Participant**, *Embracing the challenges of conflicts course*, Carl Zeiss SMT GmbH,  
2020 Oberkochen, Germany.

26 – 28 Mar 2019 **Participant**, *Dynamics and control for architects (ASML) course*, Carl Zeiss  
SMT GmbH, Oberkochen, Germany.

18 – 19 Feb 2019 **Participant**, *Agile project management: agility 4.0 course*, Carl Zeiss SMT  
GmbH, Oberkochen, Germany.

16 Jan 2019 **Participant**, *Introduction to project management in the SMT course*, Carl Zeiss  
SMT GmbH, Oberkochen, Germany.

04 – 05 Oct 2018 **Participant**, *Lateral Leadership course*, Carl Zeiss SMT GmbH, Oberkochen,  
Germany.

17 Sep – 12 Dez **Participant**, *Systems Engineering Course by the High Tech Institute*, Carl Zeiss  
2018 SMT GmbH, Oberkochen, Germany.

05 – 06 Jul 2018 **Participant**, *Project Management basic course*, Carl Zeiss SMT GmbH,  
Oberkochen, Germany.

- 11 – 12 Dez 2017 **Participant**, *Design to Value [DtV] course*, Carl Zeiss SMT GmbH, Oberkochen, Germany.
- 26 Jul 2017 **Participant**, *SMT product and technology roadmap course*, Carl Zeiss SMT GmbH, Oberkochen, Germany.
- 16 May 2017 **Participant**, *System Engineering - Basics course*, Carl Zeiss SMT GmbH, Oberkochen, Germany.
- 21 Mar 2017 **Participant**, *System Compensation, Lot Compensation and co.: Adjustment and adjustment tracking of ASML scanners course*, Carl Zeiss SMT GmbH, Oberkochen, Germany.
- 20 Mar 2017 **Participant**, *System metrology of EUV illumination systems course*, Carl Zeiss SMT GmbH, Oberkochen, Germany.
- 27 Feb 2017 **Participant**, *Assembly of EUV objectives course*, Carl Zeiss SMT GmbH, Oberkochen, Germany.
- 07 Feb 2017 **Participant**, *EUV illumination course*, Carl Zeiss SMT GmbH, Oberkochen, Germany.
- 2015 – present **Participant**, *Clean room training (repeated annually)*, Carl Zeiss SMT GmbH, Oberkochen, Germany.
- Aug – Sep 2010 **Trainee**, *HP University*, Paço de Arcos, Portugal.  
Training in:
  - HP technology
  - Markets
  - Presentation techniques
  - Sales and Negotiation
- 2005 – 2010 **Music Student**, *Conservatory of Music of Aveiro - Calouste Gulbenkian*, Portugal.  
Musical instrument:
  - Classical Guitar
- 06 – 12 Aug '06 **Participant**, *1st International Science Summer Camp '06*, Uppsala, Sweden.  
Topic:
  - Energy and the Environment
- 01 – 12 Aug '05 **Intern**, *Rutherford's Experiment*, Portuguese Nuclear and Technological Institute (ITN), Sacavém, Portugal.  
Objectives:
  - Analysis of zinc implanted sapphire using *Rutherford Backscattering Spectroscopy*

- 18 – 29 Jul '05 **Intern**, *Experimental Holography*, Department of Physics, University of Aveiro, Portugal.  
Objectives:
- Reflexion and transmission holography, multi-exposure holography, single and double beam set-ups and other
- 19 – 30 Jul '04 **Intern**, *Experimental Holography*, Department of Physics, University of Aveiro, Portugal.  
Objectives:
- Reflexion and transmission holography, multi-exposure holography, single and double beam set-ups and other
- 30 Jun – 11 Jul '03 **Intern**, *Experimental Holography*, Department of Physics, University of Aveiro, Portugal.  
Objectives:
- Reflexion and transmission holography, multi-exposure holography, single and double beam set-ups and other

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## Awards and Scholarships

- 2010 – 2014 **Doctoral scholarship (BD)**, *Fundação para a Ciência e a Tecnologia*, Portugal.
- 2013 **Funding for conference participation**, *Wilhelm und Else Heraeus-Stiftung*, Germany.
- 2010 **Scientific initiation scholarship (BIC)**, *Department of Physics, University of Aveiro*, Portugal.  
Topic:
- Numerical and analytical study of magnetic and transport phenomena in low dimensional electronic systems with strong correlations
- 2008 – 2009 **Scientific initiation scholarship (BIC)**, *Department of Physics, University of Aveiro*, Portugal.  
Topic:
- Initiation to the characterization and manipulation of nanostructures using AFM and NSOM
- 2008 **Best Student '08**, *Department of Physics, University of Aveiro*, Portugal.
- 2007 **Award**, *Best Idea of the Year Awards*, Toledo, Spain.  
Description:
- European Winner, Category *Innovate your Planet*
  - Portugal/Center winner, Category *Innovate your Planet*
- 2005 **Award - Medal/Certificate**, *17<sup>th</sup> European Union Contest for Young Scientists*, Bauman University, Moscow, Russia.  
Description:
- Award to distinguish the quality of the project at the final of the contest

2005 **Prize**, *Youth Science Association (AJC)*, Lisbon, Portugal.

Description:

- Fifth place in the contest *Youth Science Meeting (EJC)*

2005 **Prize**, *Fundação da Juventude*, Lisbon, Portugal.

Description:

- Second prize in the contest *Young Scientists and Investigators*
- Selected to participate in the final of the *17<sup>th</sup> European Union Contest for Young Scientists*

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## Languages

Self-assessment European level CEFR (C2 maximum evaluation)

		Comprehension		Speaking		Writing
		Listening	Reading	Interaction	Production	
Portuguese	<b>Mother Tongue</b>	-	-	-	-	-
English	<b>Near-native</b>	<i>C2</i>	<i>C2</i>	<i>C2</i>	<i>C2</i>	<i>C2</i>
German	<b>Advanced</b>	<i>C1</i>	<i>C1</i>	<i>C1</i>	<i>C1</i>	<i>C1</i>
Spanish	<b>Advanced</b>	<i>B2</i>	<i>B2</i>	<i>B2</i>	<i>B1</i>	<i>A2</i>
French	<b>Beginner</b>	<i>A2</i>	<i>A2</i>	<i>A2</i>	<i>A2</i>	<i>A2</i>

2010 **Academic IELTS test.**

- Listening 8.5
- Reading 8.5
- Writing 7.0
- Speaking 7.5
- Overall 8.0

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## Computer skills

Estimated number of years of continuous experience indicated between parenthesis.

Programming Languages	Assembly (ARM) (2), Bash shell scripting (10+), Fortran (2), C/C++ (10+), JavaScript (3), Matlab/Octave (10+), PHP (3), Python (10+), VHDL (2)
Parallel Programming	Apache Storm (1), CUDA (2), OpenCL (2), OpenMP (3), OpenMPI (1)
Programming Tools	Doxygen (10+), Eclipse (3), GNU Toolchain (10+), UML (3), Visual Studio (5)
Markup Languages	CSS (10+), HTML (10+), L <sup>A</sup> T <sub>E</sub> X(10+), XHTML (10+)
CAD and FEA	Abaqus (1), Catia v5 (1)
Operating systems	GNU/Linux (10+), Microsoft Windows (10+), Solaris (4)

Other	CadSoft Eagle (2), CORBA IDL (4), Rational DOORS (<1), Enterprise Architect (2), Inkscape (10+), Git (10+), Mathematica (5), Polaron (1), SageMath (3), Subversion (7), Vim (10+), Yocto Project (3)
Hardware Platforms	Atmel AVR ATmega (2), Altera/Intel FPGAs (3), ARM Cortex A/M (4+), Intel x86 (10+), Renesas RH 850 (1),
Well-known libraries	FFTW(2), GSL (3), lwIP (2), NumPy (6), OpenCV (3), SDL (3), SciPy (6), ...

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## Publications

C. Schilling, M. Altunbulak, S. Knecht, A. Lopes, J. D. Whitfield, M. Christandl, D. Gross, and M. Reiher. Generalized pauli constraints in small atoms. *Phys. Rev. A*, 97:052503, May 2018.

A A Lopes and R G Dias. Simple approach for the two-terminal conductance through interacting clusters. *arXiv:1402.5922 [cond-mat.mes-hall]*, 2014.

A. A. Lopes, B. A. Z. António, and R. G. Dias. Conductance through geometrically frustrated itinerant electronic systems. *Phys. Rev. B*, 89:235418, Jun 2014.

B A Z António, A A Lopes, and R G Dias. Transport through quantum rings. *European Journal of Physics*, 34(4):831, 2013.

A. A. Lopes and R. G. Dias. Interacting spinless fermions in a diamond chain. *Phys. Rev. B*, 84(8):085124, Aug 2011.

M. Facão, A. Lopes, A. L. Silva, and P. Silva. Computer simulation for calculating the second-order correlation function of classical and quantum light. *Eur. J. Phys.*, 32(4):925, 2011.

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## Poster Presentations

Posters produced while at Carl Zeiss SMT GmbH not included in this list due to confidentiality of the topics at hand.

8 – 12 Oct '12 *Itinerant interacting spinless fermions in an AB2 chain*, Correlations and coherence in quantum systems, University of Évora, Portugal

21 – 25 May '12 *Itinerant interacting spinless fermions in an AB2 chain*, Itinerant Spin-Orbital Systems: From Magnetic Frustration to Novel Superconductivity, MPIPKS Dresden, Germany

18 May '12 *Itinerant interacting spinless fermions in an AB2 chain*, Andrejewski Day, University of Freiburg, Germany

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## Talks

18 – 22 Mar '13 *Witnessing genuine entanglement in multi-partite systems from local information: possible but hard*, DPG Spring Meeting, Leibniz Universität Hannover, Germany

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## Scientific conferences/workshops/meetings attended

18 – 22 Mar '13 DPG Spring Meeting, Leibniz Universität Hannover, Germany



- 21 – 25 Jan '13 16th Workshop on Quantum Information Processing, Tsinghua University Beijing, China
- 8 – 12 Oct '12 Correlations and coherence in quantum systems, University of Évora, Portugal
- 1 – 6 Jul '12 Quantum Information Workshop, Seefeld, Austria
- 18 – 22 Jun '12 2nd AQUA Student Congress on Quantum Information & Computation, University of Waterloo, Canada
- 21 – 25 May '12 Itinerant Spin-Orbital Systems: From Magnetic Frustration to Novel Superconductivity, MPIPKS Dresden, Germany
- 18 May '12 Andrejewski Day, University of Freiburg, Germany
- 12 – 16 Mar '12 DPG Spring Meeting, University of Stuttgart, Germany
- 11 – 15 Oct '10 Quantum coherence and correlations in condensed-matter and cold-atom systems, University of Évora, Portugal
- 5 – 9 Jul '10 Emergence of new states of matter in magnetic systems and beyond, ICTP Trieste, Italy

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### Own projects

- 2004 **Author and Developer**, *CometZ*, Open source side scroller (available on *SourceForge*).

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### Other

- 4 Apr '06 **Speaker**, in the seminar "Science and Innovation" by invitation of the Secretary of State for Youth and Sports, Portugal.
- 11 Nov '05 **Congratulated**, by Maria da Conceição Peleteiro, Vice-President of the *Fundação para a Ciência e a Tecnologia* for the project and award in the final of the contest "17th European Union Contest for Young Scientists, Moscow, Russia", Portugal.
- 31 Aug – 01 Sep '05 **Participant**, *23rd Youth Science Meeting*, Associação Juvenil de Ciência, Lisbon, Portugal.
- 01 – 10 Sep '04 **Participant**, *XXII Youth Science Meeting*, Associação Juvenil de Ciência, Lisbon, Portugal.

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### Driver's License

- May 2006 European driver's license, category B

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### Miscellaneous

- 2003 – Present Administering my own GNU/Linux server