

# Alvaro Sanchez Gonzalez

Postgraduate Researcher in Ultrafast Science

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## Personal Information

- First Name: Alvaro
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## Education

- **Ph.D. in Ultrafast Science** **2013 – 2017 (expected March)**  
*Quantum Optics and Laser Science Group, Department of Physics, Imperial College London* *London, UK*
    - Topic: Ultrafast measurements with attosecond lasers and x-ray free electron lasers.
    - Carrying out experiments at different XFELs in Stanford, Hamburg, and Osaka, as part or large multinational collaborations.
    - Performing data analysis on large datasets (>20 TB) applying statistics and machine learning techniques.
    - Funded by Science and Technology Facilities Council (STFC).
  - **Master's Degree in Physics and Technology of Lasers** **2012 – 2013**  
*Applied Physics Department, University of Salamanca* *Salamanca, Spain*
    - 60 ECTS.
    - Final project: Implementation of a Spectral Phase Interferometer for Direct Electric-field Reconstruction (SPIDER) for sub-10 fs laser pulses.
    - Average grade: 9.54 out of 10.
  - **Licenciante Degree in Physics (B.Sc. + M.Sc.)** **2007 – 2012**  
*Faculty of Sciences, University of Salamanca* *Salamanca, Spain*
    - 5-year degree.
    - 319.5 Spanish academic credits (10 lecture hours/credit).
    - Average grade: 9.25 out of 10.
  - **Technical Engineering in Computer Systems (B.Sc.)** **2007 – 2012**  
*Faculty of Sciences, University of Salamanca* *Salamanca, Spain*
    - 3-year degree spread over 5 years, simultaneously with Physics.
    - 201 Spanish academic credits (10 lecture hours/credit).
    - Final project: "Real-time acquisition and processing software for interferometric images using CUDA".
    - Average grade: 9.53 out of 10.
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## Teaching Experience

- **Computing demonstrator** **2015 – 2016**  
*Department of Physics, Imperial College London* *London, UK*
  - Teaching object oriented programming with python in second year undergraduate physics.
- **Master's thesis supervisor** **2015 – 2016**  
*Department of Physics, Imperial College London* *London, UK*
  - Supervising two M.Sc. students on a project to apply machine learning techniques in free electron laser data analysis.
- **First year project supervisor** **2014 – 2016**  
*Department of Physics, Imperial College London* *London, UK*
  - Supervised three different groups of students with projects involving solving differential equations numerically and modeling signal propagation.
- **Laboratory demonstrator** **2014 – 2015**  
*Department of Physics, Imperial College London* *London, UK*
  - Demonstrating first year undergraduate physics laboratory.

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## Internships

- **"Collaboration Fellowship" granted by the Ministry of Education** **February-August 2012**  
*University of Salamanca in collaboration with the Spanish Pulsed Laser Centre (CLPU)* *Salamanca, Spain*
  - Development of a real-time acquisition and processing software using parallel programming with the GPU (CUDA) for images acquired in a Mach-Zehnder interferometer to retrieve the 3D density profile for a gas-jet target of a laser-based electron accelerator.
  - 6 months as a part-time job along with the regular courses including a 2700 € stipend.
- **"Undergraduate Summer Fellowship Program in Vision Science"** **June-August 2011**  
*Center for Visual Science, University of Rochester* *Rochester NY, USA*
  - Prof. David Williams' research group.
  - Building an optical system, programming the related software, and performing preliminary experiments for a study about the Stiles-Crawford effect and phototropic activity in human photoreceptors.
  - Only international student in the program.
  - 11-week program providing housing, travel expenses and a \$4500 stipend.
- **"Introduction to Research Fellowship" (JAE-Intro)** **July-August 2010**  
*Optics institute "Daza de Valdés", CSIC* *Madrid, Spain*
  - Prof. Susana Marcos Celestino's research group.
  - Topic: "Physical, Optical and Neuronal Basis of Multifocus".
  - Aligning the experimental setup, software programming and simulation for an Adaptive Optics system and a simultaneous vision optical system.
  - 9-week program including a 2000 € allowance.

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## Peer Review Articles

- 2016 **"Linac Coherent Light Source data analysis using psana"**. Damiani, D, M Dubrovin, I Gaponenko, W Kroeger, TJ Lane, A Mitra, CP O'Grady, A Salnikov, A Sanchez-Gonzalez, et al. In: *Journal of Applied Crystallography* 49.2, pp. 672–679.
- 2016 **"Stimulated x-ray Raman Scattering—a critical assessment of the building block of nonlinear x-ray spectroscopy"**. Kimberg, Victor, Alvaro Sanchez-Gonzalez, Laurent Mercadier, Clemens Weninger, Alberto Lutman, Daniel Ratner, Ryan N Coffee, Maximilian Bucher, Melanie Mucke, et al. In: *Faraday Discussions*.
- 2016 **"Machine learning applied to single-shot x-ray diagnostics in an XFEL"**. Sanchez-Gonzalez, A, P Micaelli, C Olivier, T Barillot, R Coffee, J Marangos, et al. In: *In preparation*.
- 2016 **"Polarisation response of delay dependent absorption modulation in strong field dressed helium atoms probed near threshold"**. Simpson, ER, A Sanchez-Gonzalez, DR Austin, Z Diveki, SEE Hutchinson, T Siegel, M Ruberti, V Averbukh, L Miseikis, et al. In: *New Journal of Physics* 18.8, p. 083032.
- 2015 **"Ultrafast isomerization initiated by X-ray core ionization"**. Liekhus-Schmaltz, Chelsea E, Ian Tenney, Timur Osipov, Alvaro Sanchez-Gonzalez, Nora Berrah, Rebecca Boll, Cedric Bomme, Christoph Bostedt, John D Bozek, et al. In: *Nature communications* 6.
- 2015 **"Auger electron and photoabsorption spectra of glycine in the vicinity of the oxygen K-edge measured with an X-FEL"**. Sanchez-Gonzalez, A, TR Barillot, RJ Squibb, P Kolorenč, M Agaker, V Averbukh, MJ Bearpark, C Bostedt, JD Bozek, et al. In: *Journal of Physics B: Atomic, Molecular and Optical Physics* 48.23, p. 234004.
- 2015 **"The response of a neutral atom to a strong laser field probed by transient absorption near the ionisation threshold"**. Simpson, ER, A Sanchez-Gonzalez, DR Austin, Z Diveki, SEE Hutchinson, T Siegel, M Ruberti, V Averbukh, L Miseikis, et al. In: *arXiv preprint arXiv:1512.07652*.
- 2013 **"Experimental Simulation of Simultaneous Vision"**. Gracia, Pablo de, Carlos Dorronsoro, Álvaro Sánchez-González, Lucie Sawides, and Susana Marcos. In: *Investigative ophthalmology & visual science* 54.1, pp. 415–422.
- 2012 **"Visual Performance Under Pure Simultaneous Vision"**. De Gracia, Pablo, Carlos Dorronsoro, Alvaro Sanchez-Gonzalez, Lucie Sawides, and Susana Marcos. In: *Investigative Ophthalmology & Visual Science* 53.14, pp. 6333–6333.

## Book Chapters

- 2016 **"Stimulated X-Ray Raman Scattering with Free-Electron Laser Sources"**. Rohringer, N, V Kimberg, C Weninger, A Sanchez-Gonzalez, A Lutman, T Maxwell, C Bostedt, S Carron Monterro, AO Lindahl, et al. In: *X-Ray Lasers 2014*. Springer, pp. 201–207.

## Conference Proceedings

- 2015 **"A beamline for attosecond pump-probe experiments: towards tracking ultrafast electron dynamics in atoms and molecules"**. Simpson, Emma R, Alvaro Sanchez-Gonzalez, Thomas Siegel, Zsolt Diveki, Simon EE Hutchinson, Lukas Miseikis, Christian Strüber, Dane R Austin, and Jon P Marangos. In: *SPIE Optical Engineering+ Applications*. International Society for Optics and Photonics, pp. 958402–958402.

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## Contributions to Meetings

- May 2014 **"Stimulated X-Ray Raman Scattering with Free-Electron Laser Sources"**, V. Kimberg et al., *ICXRL 2014*, 14th International Conference for X-Ray Lasers 2014, Colorado State University, Fort Collins, Colorado, USA.
- October 2012 **"The influence of the amount of power addition on simultaneous vision"**, P. de Gracia, C. Dorronsoro, A. Sanchez-Gonzalez, L. Sawides, S. Marcos, *AAO 2012*, American Academy of Optometry's 91st Annual Meeting, Phoenix AZ, USA.
- May 2012 **"Visual performance under pure simultaneous vision"**, P. de Gracia, C. Dorronsoro, A. Sanchez-Gonzalez, L. Sawides, S. Marcos, *PARD 2012*, Pan-American Research Day. Pan-American Association of Ophthalmology, Fort Lauderdale, USA.
- May 2012 **"Visual performance under pure simultaneous vision"**, P. de Gracia, C. Dorronsoro, A. Sanchez-Gonzalez, L. Sawides, S. Marcos, *ARVO 2012*, The Association for Research in Vision and Ophthalmology, Fort Lauderdale, USA.

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## Computer Skills

- Main programming languages:** Python, MATLAB, C, C++, Shell Script (Unix)
- Used at some point: LabView, CUDA, Java, Javascript, C#, Java, HTML, SQL...
  - ... and great ability to learn new languages
- Statistical data analysis:** scikit-learn, TensorFlow, SPSS
- Data visualization:** MATLAB, matplotlib
- Webserver frameworks:** django, django-rest
- Mathematical software:** Wolfram Mathematica
- Document preparation:**  $\LaTeX$
- 3D CAD design:** Autodesk Inventor
- Electromagnetic design:** SIMION, Cobham Opera

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## Awards and Honours

- Award to the best academic record of the cohort in Master's Degree in Physics and Technology of Lasers with a grade of 9.54/10.
- Award to the second best academic record of the cohort in Licenciante Degree in Physics with a grade of 9.25/10 (first award: 9.27/10, third award: 8.36/10).
- Award to the best academic record of the cohort in Technical Engineering in Computer Systems with a grade of 9.53/10 (second award 8.29/10, third award: 8.11/10).
- Award to the best final project of the year for "Real-time acquisition and processing software for interferometric images using CUDA" in Technical Engineering in Computer Systems (among 79 projects presented the same year).
- Sixth position in the Student Excellence Program for the best academic records of students finishing their Licenciante Degrees and accessing a Master's Degree university-wide.
- 27 out of 49 classes passed with distinction (With a maximum of 2.5-5% distinctions per cohort) in Licenciante Degree in Physics.
- 21 out of 31 classes passed with distinction (With a maximum of 2.5-5% distinctions per cohort) in Technical Engineering in Computer Systems.
- Graduated with distinction in high school as first of the cohort.

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## Language Skills

Spanish	Native
English	Fluent (TOEFL iBT score: 111/120)
French	Low Level
Portuguese	Low Level

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## Extracurricular Activities

- Member of the OSA (*Optical Society of America* Member Number: 1064656) as well as member of the OSA *Student Chapter "OSAL"* at the University of Salamanca.
- Participating in activities such as "The Optics Adventure", giving seminars and lab demonstrations to high school students within the student chapter.
- 2 years working as a private tutor teaching Physics and Maths to high school students.
- Class representative for one year.

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## Outside Interests

- Music: specifically playing guitar (classical and electric), piano and diatonic harmonica.
- Electronics: assembling, soldering and fixing electronic devices.
- Cinema, Literature and Travelling.