Eduardo Oliva Gonzalo

Ramón y Cajal Fellow

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Instituto de Fusión Nuclear "Guillermo Velarde"
Dep. Ing. Energética, E.T.S.I. Industriales
Universidad Politécnica de Madrid

CURRENT POSITION

2020 – 2024 Ramón y Cajal Fellow
Instituto de Fusión Nuclear "Guillermo Velarde", UPM

PREVIOUS POSITIONS

2017 – 2019 Assistant professor, tenure track (Profesor ayudante doctor)
E.T.S.I. Industriales, UPM

2015 – 2016 Marie Sklodowska-Curie Fellow
Instituto de Fusión Nuclear "Guillermo Velarde", UPM

2013 – 2014 Post-doctoral researcher
Laboratoire de Physique des Gaz et des Plasmas ; U. Paris Sud, CNRS (France)

2010 – 2012 Post-doctoral researcher
Laboratoire d´Optique Appliquée ; ENSTA, É. Polytechnique, CNRS (France)

2008 – 2010 Assistant professor (Profesor ayudante)
E.T.S.I. Industriales, UPM

EDUCATION

2010 PhD in Nuclear Science and Technology (UPM)
2010 PhD in Physics (École Polytechnique, France)
2005 BsC/MsC Industrial Engineering, E.T.S.I. Industriales, UPM
2012 BsC/MsC Physics, U.N.E.D.
2015 MsC Economics, U.N.E.D.

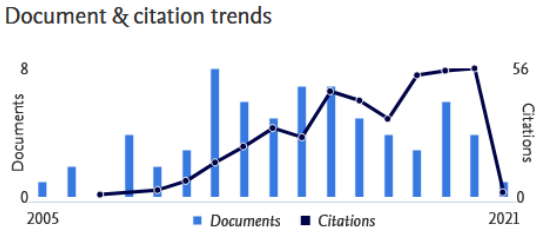
SUMMARY

I graduated in Industrial Engineering (5-years program) by the Universidad Politécnica de Madrid, Spain (UPM) in 2005. In 2010 I got a co-tutelled PhD degree on Nuclear Science and Technology (UPM) and Physics (École Polytechnique, France). The thesis received the highest marks, European Doctorate and Extraordinary Thesis Award (UPM). I obtained a post-doctoral research contract at the Laboratoire d'Optique Appliquée (CNRS) to develop a time-dependent Maxwell-Bloch code and study the amplification of soft X-rays through non homogeneous plasmas. In 2013 I started a second post-doctorate at the Laboratoire de Physique des Gaz et des Plasmas (Université Paris Sud, France). I modified a particle-in-cell code and my Maxwell-Bloch model in order to study dense, Krypton plasma amplifiers of soft X-rays. In 2015 I started my third post-doctorate at the Universidad Politécnica de Madrid, thanks to a Marie Sklodowska-Curie fellowship. I developed DAGON, a 3D Maxwell-Bloch code and studied cavity-free atmospheric Nitrogen lasers. In 2017 I obtained a tenure track position (assistant professor) at the Departamento de Ingeniería Energética of the E.T.S.I. Industriales (UPM). Nowadays, I am a Ramón y Cajal Fellow (fellowship from the Ministerio de Ciencia e Innovación). I have managed to consolidate my own research line by applying successfully to highly competitive European projects: FP7 Marie Curie IEF and H2020 FETOPEN. I also have been PI of a UPM project and a Comunidad de Madrid project, both for talented young researchers. I have attracted more than 500.000 € in funds. I have published 29 articles (21 Q1), participated in 20 research projects (PI/coordinator in 4 of them) and presented my work in 43 talks (7 invited). I have been reviewer of several Q1 journals and research agencies (Poland and Czech Republic) and received several scientific awards.

SELECTED PUBLICATIONS IN JCR JOURNALS (29 published)

I have published **29 articles** in international peer reviewed journals, **21 of them in Q1** journals. Among them **3 Nature Photonics** (as first, second and third author), **2 Physical Review Letters** (as second and corresponding author), **1 Light: Science and Applications** (as corresponding author), **5 Physical Review A** (one as senior author, two as first author, one as second), **2 Physical Review E** (as first author), **4 Optics Letters** (two as first author), **2 Optics Express** (one as second author) and **1 Computer Physics Communications**.

citations	h-index	source
505	14	Google
366	12	Web of Science
392	12	Scopus



1. **EMcLAW: An unsplit Godunov method for Maxwell´s equations including polarization, metals divergence control and AMR**, J. A. Moreno, E. Oliva and P. Velarde. *Computer Physics Communications.* 260, 107268 (2021)
2. **Nonlinear ionization dynamics of hot dense plasma observed in a laser-plasma amplifier**, F. Tuitje, *et al.* Light: Science and Applications 9 (2020) Corresponding author: E. Oliva & M. Zürch
3. **Formation dynamics of excited neutral Nitrogen molecules inside femtosecond laser filaments**, R. Danylo, *et al, Phys. Rev. Lett.* 123, 243203 (2019) Corresponding author: E. Oliva & Y. Liu
4. **Hydrodynamic evolution of plasma waveguides for soft-x-ray amplifiers**, E. Oliva, *et al, Phys. Rev. E* 97, 023203 (2018)
5. **Toward compact ultra-intense laser-based soft x-ray lasers**, S. Sebban, *et al, Plasma Physics and Controlled Fusion 60, 014030 (2017)*
6. **Nonadiabatcitity of cavity-free neutral nitrogen lasing**, P. Ding, *et al, Phys. Rev. A* 94, 033810 (2017) Corresponding author: E. Oliva (also senior author)
7. **Lasing dynamics of neutral nigrogen molecules in femtosecond filaments**, P. Ding, E. Oliva, *et al, Phys. Rev. A* 94, 043824 (2016)
8. **Experimental demonstration of the triple pulse grazing-incidence pumping scheme for a double stage transient collisional pumped x-ray laser**, S. Künzel, *et al, Jour. Phys. B: Atom and Mol. Phys.* (2016)
9. Table-top femtosecond soft X-ray laser by collisional ionization gating, A. Depresseux, E. Oliva, *et al, Nature Photonics* 9, 12, 817-821 (2015)
10. Self-regulated propagation of intense infrared pulses in elongated soft-x-ray plasma amplifiers, E. Oliva, *et al, Phys. Rev. A* 92, 023848 (2015)
11. Demonstration of a circularly polarized plasma-based soft-X-ray laser, A. Depresseux, E. Oliva, *et al, Phys. Rev. Lett.* 115, 083901 (2015)
12. Backward lasing of air plasma pumped by circularly polarized femtosecond pulses for the sake of remote sensing (BLACK), P. Ding, *et al, Opt. Exp.* 22, 29964 (2014)
13. Gain dynamics in a soft-X-ray amplifier perturbed by a strong injected X-ray field, Y. Wang, S. Wang, E. Oliva, *et al,* Nature Photonics 8, 381-384 (2014)
14. Three-dimensional Maxwell-Bloch calculation of the temporal profile of a seeded soft x-ray laser pulse, F. Tissandier, *et al, Appl. Phys. Lett.* 101, (2012)
15. Gain lifetime measurement of a Ni-like Ag soft X-ray laser, B. Ecker, E. Oliva, *et al,* Opt. Exp. 20, 253991 (2012)

16. A proposal for multi-tens of GW fully coherent femtosecond soft X-ray lasers, E. Oliva, *et al, Nature Photonics* 6, 764-767 (2012)
17. Soft x-ray plasma-based seeded multistage amplification chain, E. Oliva, *et al, Opt. Lett.* 37, 4341 (2012)
18. Comparison of natural and forced amplification regimes in plasma-based soft-x-ray lasers seeded by high-order harmonics, E. Oliva, *et al, Phys. Rev. A* 84, 013811 (2011)
19. Hydrodynamic study of plasma amplifiers for soft-x-ray lasers: A transition in hydrodynamic behavior for plasma columns with widths ranging from 20 μm to 1 mm, E. Oliva, *et al, Phys. Rev.* E 82, 056408 (2010)
20. Producing ultrashort, ultraintense plasma-based soft-x-ray laser pulses by high-harmonic seeding, D. Whittaker, *et al, Phys. Rev. A* 81, 043836 (2010)
21. Optimization of soft x-ray amplifier by tailoring plasma hydrodynamics, E. Oliva, *et al, Opt. Lett.* 34, 2640 (2009)

PARTICIPATION IN RESEARCH PROJECTS (20 national and international projects)

I have participated in **20 research projects**. Among them, I have been coordinator of a **FP7 Marie Sklodowska-Curie** project, DAGON (**16% success rate, 173.370 €**), PI of a **H2020 FETOPEN project**, VOXEL (**3% success rate, 271.000 € UPM, 3.996.875 € total**), PI of an UPM project, DERKETA (15.000 €) and I am currently PI of a Comunidad de Madrid project, CROM (55.300 €).

1. **Coherent XUV and soft X-ray sources: optimization through modelling (CROM)** 55.300 € Ayuda para la realización de proyectos de I+D para jóvenes investigadores. Comunidad de Madrid. (2020-2021) PI: Eduardo Oliva
2. **Harvesting energy through atmospheric transparency (HEAT)** 5.000 € EIT Climate-KIC (2019)
3. **Towards understanding and modelling intense electronic excitation (TUMIEE)** COST Action CA17126 (2018-2022) Grant Holder Scientific Representative: Eduardo Oliva
4. **Development of X-ray´s key technologies and applications (DERKETA)** 15.000 € Ayuda dirigida a jóvenes investigadores doctores para fortalecer sus planes de investigación. UPM (2018-2019) PI: Eduardo Oliva
5. **Experimental and theoretical study of sub-picosecond laser-induced ultrafast dynamical processes in wide band gap semiconductors nanomachining** Bulgarian National Science Fund (2018)
6. **Harvesting energy through atmospheric transparency (HEAT)** 2.500 € EIT Climate-KIC (2018)
7. **Volumetric medical X-ray imaging at extremely low dose (VOXEL)** 3.996.875 € total, 271.000 € UPM. H2020 FETOPEN, European Commission (2015-2019) PI of UPM: Eduardo Oliva
8. **Development of an AMR 3D Maxwell-Bloch code and application to coherent femto-nanoimaging (DAGON)** 173.370 € FP7 Marie Sklodowska-Curie IEF fellowship. European Commision (2015-2016). Coordinator: Eduardo Oliva
9. Reawakening of recombination lasers in the soft X-ray range (ROLEX) 474.756 € Agence Nationale de la Recherche, France. (2012-2014)
10. SHYLAX RTRA Triangle de la Physique, France. (2010-2012)

PRESENTATIONS IN CONFERENCES (43 presentations, 7 invited, one of them plenary)

1. **2D-3D multiscale modelling of inhomogeneous plasma amplifiers** International Conference on X-Ray Lasers, online (2020)

2. **3D structure of backwards-amplified UV radiation in Nitrogen plasma filaments (Invited speaker)** International Conference on Ultrafast Optical Science, Moscow (online), Russian Federation (2020)
3. **Modelling of the amplification of UV radiation in Nitrogen plasma filaments (Invited speaker)** International Conference on Ultrafast Optical Science, Moscow, Russian Federation (2019)
4. **2D and 3D modelization of plasma amplifiers of UV, XUV and soft X-rays** SPIE Optics & Photonics, San Diego, U.S.A. (2019)
5. **Modelization of plasma-based UV, XUV and soft X-ray lasers (Invited speaker)** International Conference on Photonics and Applications, Ha Long, Vietnam (2018)
6. **Hydrodynamic and Maxwell-Bloch simulation of plasma-based UV and soft X-ray lasers (Invited speaker)** International Conference on X-Ray Lasers, Prague, Czech Republic (2018)
7. **Quantifying information in repeated coordination games** Conference on dynamics, games and science, Madrid, Spain (2018)
8. **Modelling of coherent XUV and soft X-ray sources (Invited speaker)** Ultrafast Science and Technology Spain, Salamanca, Spain (2017)
9. **DAGON: a 3D Maxwell-Bloch code** SPIE Optics & Photonics, Prague, Czech Republic (2017)
10. **Quantifying information in repeated coordination games** 4th International conference on dynamics, games and science: Decision models in a complex economy, Madrid, Spain (2016)
11. **DAGON: a 3D Maxwell-Bloch code** International Conference on X-Ray Lasres, Nara, Japan (2016)
12. **Modelling of coherent XUV and soft X-ray sources (Invited speaker, plenary session)** Industriales Research Meeting, Madrid, Spain (2016)
13. Modelling of dense injection-seeded Ni-like Krypton plasma amplifiers. SPIE Optics & Photonics, San Diego, U.S.A. (2015)
14. Multi-tens of GW peak power plasma-based soft X-ray laser (Invited speaker) SPIE Optics & Photonics, San Diego, U.S.A. (2013)

AWARDS AND FELLOWSHIPS

2019 **Ramón y Cajal Fellowship** Ministerio de Ciencia e Innovación postdoctoral fellowship

2018 **Best bussiness model (HEAT)** Actúaupm, Universidad Politécnica de Madrid

2018 **Best bussiness idea (HEAT)** Actúaupm, Universidad Politécnica de Madrid

2016 **Attendance to the 66th Lindau Nobel Laureate Meeting** European Commission/ALCOA Foundation/Council for the Lindau Nobel Laureate Meetings

2013 Marie Sklodowska Curie IEF, European Commission

2011 Extraordinary Thesis Prize, Universidad Politécnica de Madrid

INDUSTRIAL PROPERTY (PATENTS)

2019 **Módulo solar termoeléctrico. P201930899**

STAYS IN FOREING RESEARCH CENTRES

2019 **Lawrence Berkeley National Laboratory,** University of California Berkeley, Berkeley (U.S.A.) working in the group of Dr. Jean Luc Vay on the subject of laser-plasma modelling with Particle In Cell codes. Period: 22nd July – 15th September 2019

2019 **Queen´s University,** Belfast (U.K.) working in the group of Prof. Jorge Kohanoff on the subject of High Harmonic Generation in solids. Period: 24th February – 1st March 2019

2013-2014 **Laboratoire de Physique des Gaz et des Plasmas,** Université Paris Sud, CNRS, Orsay (France) working in the group of Dr. Gilles Maynard as postdoctoral researcher on the subject of laser-plasma modelling. Period: 1st January 2013 – 31st December 2014

2014 **University of York,** (U.K.) working in the group of Prof. Greg Tallents on the subject of hydrodynamic modelling of plasmas. Period: 13th July – 18th July 2014

2010-2012 **Laboratore d´Optique Appliquée,** ENSTA, École Polytechnique, CNRS, Palaiseau, France, working in the group of Dr. Philippe Zeitoun as postdoctoral researcher on the subject of plasma based soft X-ray lasers. Period: 1st July 2010 – 31st December 2012

2007 **Laboratore d´Optique Appliquée,** ENSTA, École Polytechnique, CNRS, Palaiseau, France, working in the group of Dr. Philippe Zeitoun as doctoral student on the subject of plasma hydrodynamics. Period: 1st April – 30th June 2007

2006 **Laboratore d´Optique Appliquée,** ENSTA, École Polytechnique, CNRS, Palaiseau, France, working in the group of Dr. Philippe Zeitoun as doctoral student on the subject of plasma hydrodynamics. Period: 1st March – 31st August 2006

ASSESSMENT COMMITTEES AND REFEREE ACTIVITIES

2020 **Member of the programme committee of the 47th EPS conference on plasma physics**

2019 **Member of the organization committee of the 1st Training School of TUMIEE COST Action**

2019 **Member of the review committee for the masters classess and poster sessions of the 69th Lindau Nobel Laureate Meeting**

2019 **Expert evaluator for the German Academic Exchange Service**

2015-2020 **Referee in the following Q1 journals:** Journal of Computational Physics, Nature Scientific Reports, Nature Physics, Nature Communications, Optics Communications, Optics and Lasers in Engineering, ACS Photonics

2015-2020 **Referee for the Polish National Science Centrum and the Czech Science Foundation**

TEACHING EXPERIENCE

I have supervised 15 BsC and 5 MsC thesis in Industrial Engineering, the stages of 2 high school students (Lycée Français), 1 undergrad student (École Polytechnique), 1 MsC student and 1 assistant engineer (Université Paris Sud) and a 3 graduate students in engineering business. Currently I supervise 3 MsC students doing research and 2 PhD thesis on Nuclear Engineering.

I have also a broad experience teaching at bachelor and master level (engineering), both in Spanish and English, the following subjects: *Nuclear Physics, Nuclear Fusion, Energy Technologies, Energy Sources, Advanced Numerical Methods and Fluid Dynamics*. In 2011 I obtained the habilitation given by ANECA as assistant professor and associated professor and in 2019 the I3 habilitation. In addition to this, I have given courses in three summer schools as invited speaker. I also prepared stands in the European Researchers Night, Marie Sklodowska-Curie Meet the Fellows and "Semana de la Ciencia".

LANGUAGE SKILLS

Spanish (mother tongue) , English (C1), French (C1, 5 years living in France), German (A1)