Investigador Responsable: Joan Massó Bennàssar
Grup de Recerca: Física Computacional Avançada

HISTORIAL CIENTIFICOTÈCNIC DE L'EQUIP DE RECERCA: ACP (FÍSICA COMPUTACIONAL AVANÇADA) (IAC3- Dept. Física UIB) June 2018

SUMMARY REPORT OF ACTIVITIES OF THE RESEARCH GROUP:

ACP, IAC3 (UIB)
June 2018

THE ACP AT A GLANCE, June 2018

The ACP is a research group created this year in order to join the complementary expertise and skills of researches at the UIB that deal with the topic of Advanced Computational Physics with the aim to tackle more demanding and cutting edge problems. The experience of the group ranges from Soft Matter, Material Science, Computational Biomechanics, Rheology and Biofluidics to relativity and parallelized models for exascale computation. The lines of research that the group plans to develop are:

- Software for automatic code generation of dynamical multiphysics simulation models in parallel frameworks for exascale computing.
- Computational biomechanics: fluid-structure interaction and multiscale simulations
- Numerical simulations of polymer and colloidal systems (neutral, charged or magnetic). Improved numerical methods

We are proud to mention than in spite of its very recent creation, the motto of the ACP group (join the different skills and knowledge of the ACP members to tackle more challenging problems) has already been recognized already as very valuable with the award of a *Proyecto de Excelencia I+D of the Plan Nacional (DPI2017-86610-P) by part of the Spanish Ministry of Economy and Competitivity (MINECO*), in addition on early March 2018 the Centro Nacional de Supercomputación has give its approval to our research in order to use their grid of supercomputers.

Due to the recent creation of the group in 2018 we cannot provide information of the activities of the group as as a single research unit, but we will here provide information about the main achievements of the components of the ACP which will allow reviewers to get a fair view of the potential of the group.

KEY INDICATORS OF THE GROUP

- Permanent Scientific Staff: **5** **(3** members, 2 collaborators)
- Prof. Contr.Dr.: 1
- Postdocs: 1 (Date of due incorporation 1/10/2018).

- Evolution of the research students during last 5 years:
  Master Thesis: 5
  Degree Final project: 9
  European collaborations: 1
  Collaborator students and others: 10

- Research projects (in which group members are IPs): 9
  Funding of the group granted till: 12/2020

- Patents: 1
- Publications in JCR journals: 81
- Books and chapters of book: 5

- Conference contributions: 101
  Oral: 90
  Poster: 11

- Stays in foreign research institutions: 2

At a glance, some of the most representative journals in which the publications has been accepted are (roughly ordered by descending impact factor, from impact factor equal to 37 till 2):

- Nature Photonics: 1
- Nature Communications: 1
- Physical Review Letters: 5
- Physical Review X: 1
- Macromolecules: 1
- Scientific Reports: 1
- Physical Chemistry Chemical Physics: 1
- Organic electronics: 1
- Soft Matter: 3
- IEEE journal of selected topics in Quantum Electronics: 5
- Optic Letters: 2
- Computer Physics communications: 1
- Computer methods in applied mechanics and engineering: 2
- Applied Physics letters: 2
- Journal of the Royal Society Interface: 2
- European Polymer Journal : 1
- Faraday discussions: 1

- Optics Express: 1
- Journal of Chemical Physics: 2
- Physical review A: 6
- Applied Surface Science: 1
- Interface Focus: 1
- Journal of Computational Physics: 1
- Computational mechanics: 1
- Chaos: 1
- Phill.Trans. Roy.Soc. A: math., phys, and engineering sciences: 1
- Physica A: 2
- IEEE Photonic Tecnhology letters: 1
- Plos ONE: 3
- IEEE Transactions on Circuits and Systems I. Regular Papers: 1
- International Journal for numerical methods in Engineering: 1
- Physical review E: 1

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Section 1: Scientific personnel at 2018 /Personal del ACP en 2018

-**Dr. Joan Massó Bennàssar** Prof. Titular d'Universitat. [

-**Dr. Joan Stela Fiol** Prof. Titular d'Universitat.

-**Dr. Joan Josep Cerdà** Prof. Contractat Doctor Interí [

-**Dr. Carles Bona Casas** Prof. Ajudant Doctor

-**Dr. Julien Joseph Pierre Javaloyes** Prof. Titular d'Universitat.

-**Dr. Rodrigo Picos Gayá** Prof. Titular d'Universitat.

-**Dr. Andreu Rigo Gost** (Postdoc)

-**Dr. Lluís Arbona Nadal** UIB-Tècnic Mitjà [antoni.arbona@uib.es]

Section 2. Funding of the group via Research Projects/ Financiación del grupo via Proyectos de Investigación

In the period 13/14-2018 the researches of ACP have been **IPs (leading researchers)** of 9 projects. Six of them are still ongoing projects currently and we have fundings secured till 2020. In the following list you will find details about the research projects in which members of the ACP are IPs:

1. 2018 - 2020. Estudio mediante simulaciones numéricas multiescala del comportamiento del glicocálix endotelial a nivel microvascular y su rol en la formación de depósitos obstructivos. (Programa Estatal de Foment de la Investigació Científica i Tècnica d'Excel·lència: Projectes d'R+D). Ministerio de Economía, Industria y Competitividad. Ref.: DPI2017-86610-P. PI: Joan Josep Cerdà Pino; Carles Bona Casas. 176.450 euros.
2. 2016 - 2018. Peines de frecuencia generados por láseres de semiconductor. Acrònim: COMBINA. (Programa Estatal de Foment de la Investigació Científica i Tècnica d'Excel·lència: Projectes d'R+D). Ministerio de Economía y Competitividad (MINECO). Ref.: TEC2015-65212-C3-3-P. PI: Salvador Balle Monjo; Julien Javaloyes.
3. 2016 - 2019. Jets, Kilonovas y Ondas gravitacionales: astronomía de multi-mensajeros en colisiones de estrellas de neutrones. (Programa Estatal de Foment de la Investigació Científica i Tècnica d'Excel·lència: Projectes d'R+D). Ministerio de Economía y Competitividad (MINECO). Ref.: AYA2016-80289-P. PI: Carlos Palenzuela Luque; Juan Massó Bennàsar.

4. 2015 - 2018. Estudio e Implementación de Sistemas Neuromórficos en Hardware. Acrónimo: NEUROHARD. (Programa Estatal d'R+D+i Orientada als Reptes de la Societat: Projectes d'R+D). Ministerio de Economía y Competitividad (MINECO). Ref.: TEC2014-56244-R. PI: José Luis Rosselló Sanz; Rodrigo Picos Gayá
5. 2015 - 2016. Euro-Latin-American Network on Advanced Oxide Semiconductor TFTs (ELANAOST). (International Networks). European Commission. PI: Rodrigo Picos
6. 2015 - 2016. ELANAOST - Euro-Latin-American Network on Advanced Oxide Semiconductor TFTs. (COOPERATION (VII Frame Programm)). European Commission. Ref.: ERANet LAC PCA. PI: Rodrigo Picos Gayá
7. 2015 - 2017. Estudio e Implementación de Sistemas Neuromórficos en Hardware (NEUROHARD). (Programa Estatal d'R+D+i Orientada als Reptes de la Societat: Projectes d'R+D). Ministerio de Economía y Competitividad (MINECO). Ref.: TEC2014-56244-R. PI: Josep Lluis Rosselló / Rodrigo Picos
8. 2014 - 2018. Memristors - Devices, Models, Circuits, Systems and Applications . (Action Cost). European Commission. PI: Rodrigo Picos Gayá
9. 2012-2017. MuSIC - Modeling and Simulation of Cancer Growth (ERC-2012-StG_2011101). European Research Council. PI: Hector Gómez Díaz. 1.405.420€. (Carles Bona Casas participates as a member of the research team).
10. 2011-2014. THROMBUS, A quantitative model of thrombosis in intracranial aneurysms (FP7-ICT-2009-6). European Comission. PI: Guy Courbebaisse. 2.813.000€ (Carles Bona Casas participates as a member of the research team).
11. 2010-2013. MAPPER, Multiscale Applications on European e-Infrastructures (FP7-INFRASTRUCTURES-2010-2). European Comission. PI: Alfons Hoekstra. 2.400.000€ (Carles Bona Casas participates as a member of the research team).
12. 2009-2013. MeDDiCA, Medical Devices Design in Cardiovascular Applications. (FP7-PEOPLE-ITN-2008). European Comission. PI: Vanessa Díaz-Zuccarini. 2.903.444€. (Carles Bona Casas participates as a member of the research team).
13. 2018. FI-2018-1-0026 Divergence-conforming splines in microvascular fluid-structure interaction. 700.000 core-hours awarded by the RES (Red Española de Supercomputación) at MareNostrum4 in Barcelona, Spain. PI: Carles Bona-Casas.

Section 3: PhD. Thesis & Student Research Works 13/14-2018

European Union students

1. Bruno Romeira (2014-2016). Marie Curie Individual Fellowship (PI: Andrea Fiore from the University of Eindhoven and J. Javaloyes from UIB. UIB acting as external partner) . 148.000 €.

Master Thesis

2. Bartomeu Tomàs (2018). Universitat de les Illes Balears. Master's Thesis. Awaiting for the defense. Advisor: Rodrigo Picos.
3. Álvaro López. Universitat de les Illes Balears. Master's Thesis. In progress, expected in 2018. Advisor: Rodrigo Picos.
4. Salim Alam. Universitat de les Illes Balears. Master's Thesis. In progress, expected in 2018. Advisor: Rodrigo Picos.
5. Juan Sitges Riera (2015). *Rheological properties of a single magnetic filament: a Langevin Dynamics study*. Universitat de les Illes Balears. Master's Thesis. Advisor: Joan J. Cerdà.
6. Oscar Camps, Universitat de les Illes Balears. Master's Thesis Electronics Engineering (2014). Advisor: Rodrigo Picos.

Degree Final Project

7. Daniel Caballero González (2018). Aplicació de les tècniques de Machine Learning (aprenentatge automàtic) a la millora de les tècniques de càlcul de les interaccions de llarg abast electrostàtiques i magnetostàtiques. Universitat de les Illes Balears. Degree Final Project. Advisor: Joan J. Cerdà.
8. Albert Cabot Martorell (2015). *Estudi del comportament d'un filament magnetic ancorat sobre una superficie plana*. Universitat de les Illes Balears. Degree Final Project. Advisor: Joan J. Cerdà.
9. Antonio Fuentes Sempere (2016), *Implementació d'un sensor de camp electromagnètic usant Arduino*, Universitat de les Illes Balears. Degree Final Project. Advisor: Rodrigo Picos.
10. - Miquel Caimari Pons, (2016) *Disseny d'un OTA amb transistors orgànics*. Universitat de les Illes Balears. Degree Final Project. Advisor: Rodrigo Picos.
11. - Marc Alcover Serra (2016), *Fabricació i caracterització experimental de memristors*. Universitat de les Illes Balears. Degree Final Project. Advisor: Rodrigo Picos.
12. - Francesc Casasnovas Bauzà (2016), *ANALISI DE CONSUMS*

ENERGÈTICS D'HOTELS AM. Universitat de les Illes Balears. Degree Final Project. Advisor: Rodrigo Picos.

13. - Manuel Valentín Gómez Mira (2016), *Estudio del compormiento memristivo de una bombilla.* Universitat de les Illes Balears. Degree Final Project. Advisor: Rodrigo Picos.

14. - Victoria Piñar Cáceres (2016), *Despliegue de red de fibra óptica en una zona residencial.* Universitat de les Illes Balears. Degree Final Project. Advisor: Rodrigo Picos.

15. - Renato Eduardo Kevin Yanac Huertas (2016), *Desenvolupament de mòduls electrònics d'emul·lació d'una xarxa elèctrica d'alta tensió.* Universitat de les Illes Balears. Degree Final Project. Advisor: Rodrigo Picos.

Others

16. Patricia Llabrés (2018). *Dentro del Programa de Introducción de Estudiantes a la Investigación Científica (Alumnos Colaboradores Tipo A)*. Universitat de les Illes Balears. Research Project. Advisor: Rodrigo Picos.
17. María García (2018). *Dentro del Programa de Introducción de Estudiantes a la Investigación Científica (Alumnos Colaboradores Tipo A)*. Universitat de les Illes Balears. Research Project. Advisor: Rodrigo Picos.
18. Pedro Guadalajara (2017). *Dentro del Programa de Introducción de Estudiantes a la Investigación Científica (Alumnos Colaboradores Tipo A)*. Universitat de les Illes Balears. Research Project. Advisor: Rodrigo Picos.
19. Lydia Molina (2017). *Dentro del Programa de Introducción de Estudiantes a la Investigación Científica (Alumnos Colaboradores Tipo A)*. Universitat de les Illes Balears. Research Project. Advisor: Rodrigo Picos.
20. Caterina Dias, Univ. Porto (2017), stay of 1 month at UIB under action NANOVAR 2. Advisor: Rodrigo Picos.
21. Alberto Rodríguez, UPC (2016) stay of 1 month at UIB under COST action#1401 MemoCIS. Advisor: Rodrigo Picos.
22. Alejandro Hermoso Verger (2015). *Call for Summer Undergraduate Research Fellowships (SURF): Study of dense magnetoliposomes using Monte Carlo*. Universitat de les Illes Balears. Research Project. Advisor: Joan J. Cerdà.
23. (2013). *Dentro del Programa de Introducción de Estudiantes a la Investigación Científica (Alumnos Colaboradores Tipo A)*. Universitat de les Illes Balears. Research Project. Advisor: Rodrigo Picos.
24. Stephen Borja Ruiz Miró (2013). *Introducción al estudio de los cepillos magnéticos. Dentro del Programa de Introducción de Estudiantes a la Investigación Científica (Alumnos Colaboradores Tipo A)*. Universitat de les

Illes Balears. Research Project. Advisor: Joan J. Cerdà.

25. Ricardo José López Pérez (2013). *Dentro del Programa de Introducción de Estudiantes a la Investigación Científica (Alumnos Colaboradores Tipo A)*. Universitat de les Illes Balears. Research Project. Advisor: Rodrigo Picos.

Section 4: Details about the Scientific Production 13/14-2018 / Detalles sobre la Producción Científica 13/14-2018

Patents, Software and Data Base

CAMARERO DE LA ROSA, David ; LAGZIRI, Manal;GARCÍA MORENO, Eugeni; PICOS GAYÁ, Rodrigo Ref. 201330067. Interruptor con resistencia modificable (SPAIN, 22/01/2013).

Journal Publications in JCR journals

(1) A. Romero; J. González; R. Picos; M.J. Deen; J.A. Jiménez-Tejada (2018). Evolutionary parameter extraction for an organic TFT compact model including contact effects. *Organic Electronics*. ISSN: 1566-1199

(2) Mohamad Moner Al Chawa, Carol de Benito, Rodrigo Picos (2018). A Simple Piecewise Model of Reset/Set Transitions in Bipolar ReRAM Memristive Devices. *Regular Papers*. ISSN: 1549-8328

(3) V. Azeñas; J. Cuxart; R. Picos; H. Medrano; G. Simó; A. López-Grifol; J. Gulías (2018). Thermal regulation capacity of a green roof system in the Mediterranean region: The effects of vegetation and irrigation level. *Energy and Buildings*. ISSN: 0378-7788

(4) Al Chawa MM; Picos R; Roldan JB; Jimenez-Molinos F; Villena MA; de Benito C (2018). Exploring resistive switching based memristors in the charge-flux domain, a modeling approach. *International Journal of Circuit Theory and Applications, 46*(1), 29-38. http://onlinelibrary.wiley.com/doi/10.1002/cta.2397/full ISSN: 0098-9886

(5) Pyanzina,Elena S.; Sánchez, Pedro A.; Cerdà, Joan J. ; Sintes, Tomas; Kantorovich, Sofia S. (2017). Scattering properties and internal structure of magnetic filament brushes. *Soft Matter, 13*, 2590-2602. http://pubs.rsc.org/en/content/articlehtml/2017/SM/C6SM02606K ISSN: 1744-683X

(6) Bruno Romeira ; José M. L. Figueiredo ; Julien Javaloyes (2017). Delay dynamics of neuromorphic optoelectronic nanoscale resonators: Perspectives and applications. *International Journal of Bifurcation and Chaos, 27*(11), 114323. https://doi.org/10.1063/1.5008888 ISSN: 0218-1274

(7) B. Garbin ; J. Javaloyes ; S. Barland ; G. Tissoni (2017). Interactions and collisions of topological solitons in a semiconductor laser with optical injection and feedback. *International Journal of Bifurcation and Chaos, 27*(11), 114308. https://doi.org/10.1063/1.5006751 ISSN: 0218-1274

(8) C. Gordón ; M. Cumbajín ; G. Carpintero ; E. Bente ; J. Javaloyes (2017). Absorber

Length Optimization of On-Chip Colliding Pulse Mode-Locked Semiconductor Laser. *IEEE Journal of Selected Topics in Quantum Electronics, 24*(1). ISSN: 1077-260X

(9) Garbin, B. ; Dolcemascolo, A. ; Prati, F. ; Javaloyes, J. ; Tissoni, G. ; Barland, S. (2017). Refractory period of an excitable semiconductor laser with optical injection. *Physical Review E, 95*, 012214-1-012214-8. ISSN: 1539-3755

(10) D. A. Rozhkov; E. S. Pyanzina; E. V. Novak; J. J. Cerdà; T. Sintes; M. Ronti; P. A. Sánchez; S. S. Kantorovich (2018). Self-assembly of polymer-like structures of magnetic colloids: Langevin dynamics study of basic topologies. *Molecular Simulation, 44*, 507-515. http://dx.doi.org/10.1080/08927022.2017.1378815 ISSN: 0892-7022

(11) Gurevich, S. V. ; Javaloyes, J. (2017). Spatial instabilities of light bullets in passively-mode-locked lasers. *Physical Review A, 96*(2), 023821-023832. https://link.aps.org/doi/10.1103/PhysRevA.96.023821 ISSN: 1050-2947

(12) Casquero, Hugo ;Bona-Casas, Carles ;Gomez, Hector (2017). NURBS-based numerical proxies for red blood cells and circulating tumor cells in microscale blood flow. *Computer Methods in Applied Mechanics and Engineering, 316*, 646-667. ISSN: 0045-7825

(13) Mohamed E.A. Bassalah; Joan J. Cerdà; Tomás Sintes; Adel Aschi; Tahar Othman (2017). Complex between cationic like-charged polyelectrolytes/ surfactants systems. *European Polymer Journal, 96*, 55-68. http://www.sciencedirect.com/science/article/pii/S0014305717310807 ISSN: 0014-3057

(14) C Dias; H Lv; R Picos; P Aguiar; S Cardoso; PP Freitas; J Ventura (2017). Bipolar resistive switching in Si/Ag nanostructures. *Applied Surface Science, 424*(1), 122-126. ISSN: 0169-4332

(15) Javaloyes, J. ; Marconi, M. ; Giudici, M. (2017). Nonlocality Induces Chains of Nested Dissipative Solitons. *Physical Review Letters, 119*(3), 033904-033909. https://link.aps.org/doi/10.1103/PhysRevLett.119.033904 ISSN: 0031-9007

(16) Joshua Robertson ; Tao Deng ; Julien Javaloyes ; Antonio Hurtado (2017). Controlled inhibition of spiking dynamics in VCSELs for neuromorphic photonics: theory and experiments. *Optics Letters, 42*(8), 1560-1563. https://doi.org/10.1364/OL.42.001560 ISSN: 0146-9592

(17) Gemma Simó; Vicente García-Santos; Maria A. Jiménez; Daniel Martínez-Villagrasa; Rodrigo Picos; Vicente Caselles; Joan Cuxart (2016). Landsat and local land surface temperatures in a heterogeneous terrain compared to MODIS values. *Remote Sensing, 8*, 849. Publicació online (http://www.mdpi.com/2072-4292/8/10/849) ISSN: 2072-4292

(18) Pedro Sánchez; Elena

Pyanzina; Ekaterina Novak; Joan J. Cerdà; Tomàs Sintes; Sofia Kantorovich (2016). Magnetic filament brushes: tuning the properties of a magnetoresponsive supramolecular coating. *Faraday Discussions, 186*, 241-263. http://pubs.rsc.org/en/content/articlelanding/2015/fd/c5fd00133a#!divAbstract ISSN: 1359-6640

(19) Romeira, B. ; Av{\'o}, R. ; Figueiredo, Jos{\'e} M. L. ; Barland, S. ; Javaloyes, J. (2016). Regenerative memory in time-delayed neuromorphic photonic resonators. *Scientific Reports*, 1-12. ISSN: 2045-2322

(20) Cerdà, J.J.; Sánchez, P.; Lüsebrink, D.; Kantorovich, S.; Sintes, T. (2016). Flexible magnetic filaments under the influence of external magnetic fields in the limit of infinite dilution. *Physical Chemistry Chemical Physics, 186*, 241-263. http://pubs.rsc.org/en/content/articlelanding/2015/fd/c5fd00133a#!divAbstract ISSN: 1463-9076

(21) Camelin, P. ; Javaloyes, J. ; Marconi, M. ; Giudici, M. (2016). Electrical addressing and temporal tweezing of localized pulses in passively-mode-locked semiconductor lasers. *Physical Review A, 94*, 063854-1-063854-12. http://link.aps.org/doi/10.1103/PhysRevA.94.063854 ISSN: 1050-2947

(22) Daniel Lüsebrink;, Joan J. Cerdà; Pedro A. Sánchez; Sofia S. Kantorovich; Tomás Sintes (2016). The behavior of a magnetic filament in flow under the influence of an external magnetic field. *Journal of Chemical Physics, 145*(23), 234902. http://scitation.aip.org/content/aip/journal/jcp/145/23/10.1063/1.4971860 ISSN: 0021-9606

(23) J. Javaloyes (2016). Cavity Light Bullets in Passively Mode-Locked Semiconductor Lasers. *Physical Review Letters, 116*(4), 043901-1-043901-5. ISSN: 0031-9007

(24) Javaloyes, J. ; Camelin, P. ; Marconi, M. ; Giudici, M. (2016). Dynamics of Localized Structures in Systems with Broken Parity Symmetry. *Physical Review Letters, 116*(13), 133901-1-133901-6. ISSN: 0031-9007

(25) M. Marconi ; J. Javaloyes ; F. Raineri ; J. A. Levenson ; A. M. Yacomotti (2016). Asymmetric mode scattering in strongly coupled photonic crystal nanolasers. *Optics Letters, 41*(24), 5628-5631. ISSN: 0146-9592

(26) Casquero, Hugo ;Liu, Lei ;Bona-Casas, Carles ;Zhang, Yongjie ;Gomez, Hector (2016). A hybrid variational-collocation immersed method for fluid-structure interaction using unstructured T-splines. *International Journal for Numerical Methods in Engineering, 105*(11), 855-880. ISSN: 0029-5981

(27) Garbin, B. ; Javaloyes, J. ; Tissoni, G. ; Barland, S. (2015). Topological solitons as addressable phase bits in a driven laser. *Nature Communications, 6*, 5915. ISSN: 2041-1723

(28) Picos, R.; Roldán, J.B.; Al

Chawa, M.M.; García-Fernández, P.; Jiménez-Molinos, F.; Garcia-Moreno, E. (2015). Semiempirical Modeling of Reset Transitions in Unipolar Resistive-Switching based Memristors. *Radioengineering, 24*(12). https://www.radioeng.cz/fulltexts/2015/15_02_0420_0424.pdf ISSN: 1210-2512

(29) Barceló, F.; Cerdà, J.J.; Gutiérrez, A.; Jimenez-Marco, T.; Durán, M.A.; Novo, A.; Ros, T.; Sampol, A.; Portugal, J. (2015). Characterization of Monoclonal Gammopathy of Undetermined Significance by Calorimetric Analysis of Blood Serum Proteome. *Plos One, 10*(3), e0120316. http://www.plosone.org/article/fetchObject.action?uri=info:doi/10.1371/journal.pone.0120316&representation=PDF ISSN: 1932-6203

(30) Marconi, M.; Javaloyes, J.; Barland, S.; Balle, S.; Giudici, M. (2015). Vectorial dissipative solitons in vertical-cavity surface-emitting lasers with delays. *Nature Photonics, 9*(7), 450-455. ISSN: 1749-4885

(31) Sánchez, P.A.; Cerdà, J.J.; Sintes, T.M.; Ivanov, A.O.; Kantorovich, S.S (2015). The effect of links on the interparticle dipolar correlations in supramolecular magnetic filaments. *Soft Matter, 11*, 2963-2972. http://pubs.rsc.org/en/content/articlelanding/2015/sm/c5sm00172b#!divAbstract ISSN: 1744-683X

(32) Tahir, Hannan ;Nicolescu, I ;Bona-Casas, Carles ;Merks, RMH ;Hoekstra, A.G. (2015). An in silico study on the role of smooth muscle cell migration in neointimal formation after coronary stenting. *Journal Of The Royal Society Interface, 12*(108), 20150358. ISSN: 1742-5689

(33) Marconi, M.; Javaloyes, J.; Camelin, P.; Chaparro Gonzalez, D.; Balle, S.; Giudici, M. (2015). Control and Generation of Localized Pulses in Passively Mode-Locked Semiconductor Lasers. *IEEE Journal of Selected Topics in Quantum Electronics, 21*(6), 1-10. Link article IEEE-JSTQE (http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7111225&isnumber=6919805) ISSN: 1077-260X

(34) Perez-Serrano, A.; Vilera, M.; Javaloyes, J.; Tijero, J.M.G.; Esquivias, I.; Balle, S. (2015). Wavelength Jumps and Multimode Instabilities in Integrated Master Oscillator Power Amplifiers at 1.5 μ m: Experiments and Theory. *IEEE Journal of Selected Topics in Quantum Electronics, 21*, 1-9. ISSN: 1077-260X

(35) Bueno, Jesus ;Bona-Casas, Carles ;Bazilevs, Yuri ;Gomez, Hector (2015). Interaction of complex fluids and solids: theory, algorithms and application to phase-change-driven implosion. *Computational Mechanics, 55*(6), 1105-1118. ISSN: 0178-7675

(36) Casquero, H.; Bona-Casas, C.; Gomez, H. (2015). A NURBS-based immersed methodology for fluid-structure interaction. *Computer Methods in Applied Mechanics and Engineering, 284*, 943-970.

ISSN: 0045-7825

(37) Pedro A. Sánchez; Elena S. Pyanzina; Ekaterina V. Novak; Joan J. Cerdà; Tomàs Sintes; Sofia Kantorovich (2015). Supramolecular Magnetic Brushes: The Impact of Dipolar interactions on the Equlibrium Structure. *Macromolecules, 48*(20), 7658-7669. http://pubs.acs.org/doi/abs/10.1021/acs.macromol.5b01086 ISSN: 0024-9297

(38) Hurtado, Antonio; Javaloyes, Julien (2015). Controllable spiking patterns in long-wavelength vertical cavity surface emitting lasers for neuromorphic photonics systems. *Applied Physics Letters, 107*(24), 241103-1-241103-5. ISSN: 0003-6951

(39) Javaloyes, J; Ackemann, T.; Hurtado, A. (2015). Arrest of Domain Coarsening via Antiperiodic Regimes in Delay Systems. *Physical Review Letters, 115*(22), 223901-223906. ISSN: 0031-9007

(40) Arbona, A.; Bona, C.; Massó, J.; Miñano, B.; Plastino, A. (2015). A Fisher-gradient complexity in systems with spatio-temporal dynamics. *Physica A, 12*(093). ISSN: 0378-4371

(41) Romeira, B.; Fanqi Kong; Figueiredo, J.M.L.; Javaloyes, J.; Jianping Yao (2015). High-Speed Spiking and Bursting Oscillations in a Long-Delayed Broadband Optoelectronic Oscillator. *Journal of Lightwave Technology, 33*(2). ISSN: 0733-8724

(42) J. Javaloyes; S. Balle (2015). Rational Chebyshev spectral transform for the dynamics of broad-area laser diodes. *Journal of Computational Physics, 298*, 801 - 815. http://www.sciencedirect.com/science/article/pii/S0021999115004246 ISSN: 0021-9991

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Book Publications

1. Barland, S.; Giudici, M.; Javaloyes, J.; Tissoni, G. (2015). Localized states in semiconductor microcavities, from transverse to longitudinal structures and delayed systems. In *Nonlinear Optical Cavity Dynamics: From Microresonators to Fiber Lasers* (pp. 77 - 106). Wiley-Vch. ISBN: 9783527686476. http://dx.doi.org/10.1002/9783527686476.ch4

2. Alorda Ladaria, B.; Moià Pol, A.; Picos Gayà, R.; Pons Bonafé, P.J. (2013). Instalaciones de Telecomunicaciones. In *Instalaciones de Telecomunicaciones* (pp. 1 - 269). Edicions UIB. ISBN: 978-84-8384-256-0.

3. Romeira, B. ; Figueiredo, J.; Ironside, C.N. ; Javaloyes, J. (2013). Dynamics of Liénard Optoelectronic Oscillators. In *Advances in Nonlinear Dynamics Synchronization with Selected Applications in Theoretical Electrical Engineering in the serie 'Studies in Computational Intelligence* . Springer. ISBN: 978-3-642-37780-8.

4. Avrutin, E. and Javaloyes, J. (2017). Mode-Locked Semiconductor Lasers. In *Handbook of Optoelectronic Device Modeling and Simulation* (pp. 183 - 233). CRC Press/ Taylor & Francis Group. ISBN: 9781498749381. https://www.crcpress.com/Handbo

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5. Raúl Toral; Joan Josep Cerdà (2015). Introducción a las ecuaciones diferenciales ordinarias. In *Introducción a las ecuaciones diferenciales ordinarias*. Editorial Síntesis. ISBN: 9788490772126. http://www.sintesis.com/ingenieria-y-ciencia-209/introduccion-a-las-ecuaciones-diferenciales-ordinarias-ebook-2032.html

Stays in foreign research institutions

1. C. Bona-Casas, University of Amsterdam, Section of Computational Science, Institute of Informatics. 2013, 180 days. (the stay actually started in 2011, spanning a total of 2 years and 3 months).
2. C. Bona-Casas, Universidade da Coruña, Escuela de Caminos, Canales y Puertos. 2013-2015. (900 days).
3. J. Massó: Invited stay at the National Center for Supercomputing Applications, University of Illinous at Urbana-Champaign, IL, USA. 30 days.
4. J.J.Cerdà, Università di Roma 'La Sapienza', Dept. of Physics, Rome, 2013, 15 days.
5. J.J.Cerdà, University of Wien. Group of Comp. Phys., Dpt. Physics, 2013, 7 days.
6. J. Javaloyes. Université de Nice sophia-antipolis. 2015. 30 days.
7. J. Javaloyes. : WeierStrass Institute for Applied Analysis and Stochastics. 2014. 30 days.
8. J. Javaloyes. Institut non lineare de Nice. 2013. 30 days.

Conference Contributions

1. Hugo Casquero, Jessica Zhang, Carles Bona-Casas, Hecor Gómez (2018). The divergence-conforming immersed boundary method: application to microscale blood flow. European Conference on Computational Mechanics and Computational Fluid Dynamics, Glasgow, UK.
2. Joan J. Cerdà, Daniel Lusebrink, Pedro Sanchez, Sofia Kantorovich, Tomàs Sintes (2018). *Magnetic brushes in particle flows: towards tunable selective nanofilters*. Presentation of a paper, Flowing Matter 2018, Lisboa, PORTUGAL.
3. Antonio Hurtado ; Joshua Robertson ; Tao Deng ; Julien Javaloyes (2017). *Controlled inhibition of spiking dynamics in VCSELs for neuromorphic photonics: theory and experiments*. Keynote address, Computational Neuroscience and Optical Dynamics, Valbonne, FRANCE.
4. Bruno Romeira; Julien Javaloyes ; José Figueiredo (2017). *Brain-inspired nano-optoelectronic circuits for neuromorphic*

computing. Presentation of a paper,43rd International Conf. on Micro and Nanoengineering, Braga, PORTUGAL.

5. Bruno Romeira ; Julien Javaloyes ; José Figueiredo (2017). *Regenerative memory in time-delayed neuromorphic photonic resonators*. Keynote address, Computational Neuroscience and Optical Dynamics, Valbonne, FRANCE.
6. Carlos Diego Gordon Gallegos ; Vicente Morales ; Guillermo Carpintero del Barrio ; Julien Javaloyes (2017). *Numerical Model of On-chip Mode-locked Lasers for Millimeter Wave Generation*. Presentation of a paper, Progress In Electromagnetics Research Symposium, St Petersburg, RUSSIAN FEDERATION.
7. C. Gordon ; V. Morales ; G. Carpintero ; J. Javaloyes (2017). *Numerical modeling and parameterization of on-chip colliding pulse mode-locked lasers*. Presentation of a paper, 2017 IEEE MTT-S International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization for RF, Microwave, and Terahertz Applications (NEMO). 10.1109/NEMO.2017.7964227, Seville, SPAIN.
8. C. Weber ; J. Javaloyes ; O. Nikiforov ; S. Breuer (2017). *Timing jitter and multi-gigahertz pulse train repetition rate control of a long monolithic multi-section quantum dot semiconductor laser*. Presentation of a paper, 2017 19th International Conference on Transparent Optical Networks (ICTON). 10.1109/ICTON.2017.8024776, Girona, SPAIN.
9. Garbin, B. ; Javaloyes, J. ; Tissoni, G. ; Barland, S. (2017). *Localized states in semiconductors: from spatially extended to delayed systems*. Keynote address, Pattern Dynamics in Nonlinear Optical Cavities, Auckland, NEW ZEALAND.
10. J. Javaloyes (2017). *Cavity Light Bullets in Passively Mode-Locked Semiconductor Lasers*. Presentation of a paper, 2017 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference. http://www.osapublishing.org/abstract.cfm?URI=CLEO_Europe-2017-EF_2_1, Munich, GERMANY.
11. J. Javaloyes ; M. Marconi ; M. Giudici (2017). *Electrical Addressing and Temporal Tweezing of Localized Pulses in Passively Mode-Locked Semiconductor Lasers*. Presentation of a paper, 2017 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference. http://www.osapublishing.org/abstract.cfm?URI=CLEO_Europe-2017-CB_8_6, Munich, GERMANY.
12. J. Javaloyes ; M. Marconi ; M. Giudici (2017). *Nonlocality Induces Knotted Chains of Localized Structures in Lasers*. Presentation of a paper, 2017 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference. http://www.osapublishing.org/abst

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13. J. Javaloyes ; P. Camelin ; M. Marconi ; M. Giudici (2017). *Electrical addressing and temporal tweezing of localized pulses in passively mode-locked semiconductor lasers*. Keynote address, 2017 19th International Conference on Transparent Optical Networks (ICTON). 10.1109/ICTON.2017.8024778, Girona, SPAIN.
14. J.J. Cerdà, P. Sánchez, S. Kantorovich, T. Sintes (2017). *Nanoparticle separators and nanoactuators using magnetically active polymer brushes*. Poster, FISES-17, XXI Congreso de Física Estadística, 30 March - 1st April, Sevilla, SPAIN.
15. Joan J. Cerdà, Daniel Lusebrink, Pedro Sanchez, Sofia Kantorovich, Tomàs Sintes (2017). *Magnetic filaments under flow*. Presentation of a paper, Flowing Matter 2017, Porto, PORTUGAL.
16. Julien Javaloyes ; Patrice Camelin ; Mathias Marconi ; Massimo Giudici (2017). *Mode-Locking in semiconductor lasers: from pulses toward temporal localized structures*. Keynote address, Pattern Dynamics in Nonlinear Optical Cavities, Auckland, NEW ZEALAND.
17. Julien Javaloyes ; Patrice Camelin ; Mathias Marconi ; Massimo Giudici (2017). *Electrical addressing and temporal tweezing of localized pulses in passively mode-locked semiconductor lasers*. Keynote address, III International Conference on Applications in Optics and Photonics (AOP 2017), Faro, PORTUGAL.
18. Julien Javaloyes ; Svetlana Gurevich (2017). *Dissipative light bullets in mode-locked optical cavities*. Keynote address, Pattern Dynamics in Nonlinear Optical Cavities, Auckland, NEW ZEALAND.
19. Martin Birkholz ; Julien Javaloyes abd Olaf Nikiforov ; Christoph Weber ; Stefan Breuer (2017). *Numerical modeling of mode-locking repetition rate transitions in monolithic multi-section semiconductor lasers*. Presentation of a paper, European Semiconductor Laser Workshop, Göteborg, DENMARK.
20. Massimo Giudici ; Patrice Camelin ; Mathias Marconi ; Julien Javaloyes (2017). *Generation and tweezing of localized structures in passively mode-locked lasers*. Keynote address, International Symposium on Physics and Applications of Laser Dynamics, Paris, FRANCE.
21. Mathias Marconi ; Julien Javaloyes ; Fabrice Raineri ; Ariel Levenson ; Alejandro M. Yacomotti (2017). *Photon Statistics and Non-equilibrium Dynamics in Invited Photonic Crystal Coupled Nanolasers*. Keynote address, Progress In Electromagnetics Research Symposium, St Petersburg, RUSSIAN FEDERATION.
22. Mathias Marconi ; Julien Javaloyes ; Fabrice Raineri ; Juan Ariel Levenson ; Alejandro M. Yacomotti (2017). *Asymmetric mode scattering in strongly coupled photonic crystal*

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24. M. Marconi ; F. Raineri ; J. Javaloyes ; A. Levenson ; A. Yacomotti (2017). *Asymmetric mode scattering in strongly coupled photonic crystal nanolasers*. Presentation of a paper, 2017 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference. http://www.osapublishing.org/abstract.cfm?URI=CLEO_Europe-2017-EF_7_6, Munich, GERMANY.
25. M. Marconi ; J. Javaloyes ; A. Levenson ; A. Yacomotti (2017). *Superthermal Photon Statistics in Coupled Photonic Crystal Semiconductor Nanolaser*. Presentation of a paper, 2017 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference. http://www.osapublishing.org/abstract.cfm?URI=CLEO_Europe-2017-CB_5_5, Munich, GERMANY.
26. M. Marconi ; J. Javaloyes ; P. Hamel ; F. Raineri ; A. Levenson ; A. M. Yacomotti (2017). *Long-tailed superthermal light as a quenching process in coupled photonic-crystal nanolasers*. Keynote address, 2017 19th International Conference on Transparent Optical Networks (ICTON. 10.1109/ICTON.2017.8024751, Girona, SPAIN.
27. Patrice Camelin ; Mathias Marconi ; Julien Javaloyes ; Massimo Giudici (2017). *Temporal Localized Structures in Semiconductor Lasers*. Presentation of a paper, European Semiconductor Laser Workshop, Göteborg, DENMARK.
28. Svetlana Gurevich; Christian Schelte; Julien Javaloyes (2017). *Bifurcation Analysis of the Transverse Profile of Light Bullets in Passively Mode-Locked Semiconductor Lasers*. Presentation of a paper, 2017 European Conference on Lasers and Electro-Optics - European Quantum Electronics Conference, Munich, GERMANY.
29. Bruno Garbin ; Julien Javaloyes ; Stephane Barland ; Giovanna Tissoni (2016). *Topological solitons as addressable phase bits in a driven laser*. Presentation of a paper, Photonics and Fiber Technology 2016 (ACOFT, BGPP, NP). http://www.osapublishing.org/abstract.cfm?URI=NP-2016-NW3B.2, Sidney, AUSTRALIA.
30. Bruno Romeira ; José Figueiredo ; Julien Javaloyes (2016). *Photonic memories using time-delayed neuromorphic optoelectronic resonators*. Keynote address, Dynamics Days Europe, Corfou, GREECE.

31. Garbin, B. ; Javaloyes, J. ; Tissoni, G. ; Barland, S. (2016). *Particle-like behavior of propagative dissipative optical solitons*. Keynote address, International Conference on Optics, Photonics & Materials, Nice, FRANCE.
32. Garbin, B. ; Javaloyes, J. ; Tissoni, G. ; Barland, S. (2016). *Trapping dissipative solitons in a neuromorphic laser system*. Keynote address, III International Symposium Advances in Nonlinear Photonics, Minsk, RUSSIAN FEDERATION.
33. Julien Javaloyes (2016). *Cavity Light Bullets in Passively Mode-Locked Lasers*. Keynote address, Pattern Dynamics in Nonlinear Optical Cavities, Dresden, GERMANY.
34. Julien Javaloyes (2016). *Light localization in semiconductor lasers*. Keynote address, International Workshop: Nonlinear Dynamics in Semiconductor Lasers, Berlin, GERMANY.
35. Julien Javaloyes ; Patrice Camelin ; Mathias Marconi ; Massimo Giudici (2016). *Addressing and Temporal Tweezing of Localized Pulses in Passively Mode-Locked Semiconductor Lasers*. Presentation of a paper, European Semiconductor Laser Workshop, Darmstadt, GERMANY.
36. M. Marconi ; P. Camelin ; M. Giudici ; J. Javaloyes ; D. Chaparro ; S. Balle (2016). *Localized pulses in passively mode-locked semiconductor lasers*. Presentation of a paper, 2016 Photonics North (PN). 10.1109/PN.2016.7537880, Quebec City, CANADA.
37. M. Marconi ; P. Camelin ; S. Balle ; J. Javaloyes ; M. Giudici (2016). *Temporal localized structures in mode-locked semiconductor laser*. Presentation of a paper, 2016 International Conference Laser Optics (LO). 10.1109/LO.2016.7550033, St Petersburg, RUSSIAN FEDERATION.
38. Bruno Romeira ; José Figueiredo ; Julien Javaloyes (2015). *Reconfigurable memories using temporal localized states of light in time-delayed neuromorphic photonic oscillators*. Keynote address, International Conference on Advanced Laser Technologies ALT'15, Faro, PORTUGAL.
39. Carol de Benito, Rodrigo Picos, Spyridon Nikolaidis, Magali Estrada (2015). *A compact delay model for OTFT switches*. Presentation of a paper, International Conference on Modern Circuits and Systems Technologies (MOCAST), Thessaloniki, GREECE.
40. C. Bona, J. Massó (2015). . Paper, XVII Congrés de la Societat Catalana de Cirugia Cardiaca, Barcelona, SPAIN.
41. Cerdà, J.J.; Sintes, T.; Sánchez, P. (2015). *Magnetic Brushes: a numerical study of their phase diagram*. Poster, FISES 2015, XX Congreso de Física Estadística , Badajoz, 5-7 Octubre, SPAIN.
42. Garbin, B. ; Javaloyes, B. ; Tissoni, G. ; Barland, S. (2015). *From an excitable semiconductor laser to an optical memory for phase bits*. Keynote address, Nonlinear Photonics: Theory,

Materials, Applications, St Petersburg, RUSSIAN FEDERATION.

43. Garcia-Moreno, E.; Picos, R.; Moner Al-Chawa, M. (2015). *SPICE Model for unipolar RRAM Based on a Flux-Controlled Memristor*. Presentation of a paper, 2015 IEEE Autumn Meeting on Power, Electronics and Computing Homepage, Ixtapa, MEXICO.
44. J. Massó (2015). . Unspecified, ERE 2015 'Stepping into the second century', Palma, SPAIN.
45. Julien Javaloyes (2015). *Dissipative Light Bullets in Passively Mode-Locked Semiconductor Lasers*. Keynote address, Nonlinear Photonics: Theory, Materials, Applications, St Petersburg, RUSSIAN FEDERATION.
46. Julien Javaloyes ; Mathias Marconi ; Salvador Balle ; Massimo Giudici (2015). *Temporal Localized Structures in VCSELs with delays*. Presentation of a paper, International Conference on Advanced Laser Technologies ALT'15, Faro, PORTUGAL.
47. Julien Javaloyes ; Mathias Marconi ; Salvador Balle ; Massimo Giudici (2015). *Temporal Localized Structures in Mode-Locked Lasers: Generation and Control*. Keynote address, {Nonlinear Photonics: Theory, Materials, Applications, St Petersburg, RUSSIAN FEDERATION.
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