Carlos Granero Belinchón

PhD in Physics and Signal Processing from ENS de Lyon

Nationality: Spanish
Date of birth: 1992-06-20
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Employment

01/08/2020 - nowadays **Associate professor (PhD)**, *IMT-Atlantique, Signal and Communications department, Lab-STICC, research group Ocean Signal and Environment*, Brest.

01/11/2018 - 30/06/2020 **Postdoctoral researcher (PhD)**, *ONERA: The french aerospace lab, Département Optique et Techniques Associées (DOTA)*, Toulouse.

Education

2015 - 2018 **Ph.D in physics and signal processing: Multiscale Information Transfer in Turbulence**, *Laboratoire de Physique de l'École Normale Supérieure de Lyon (ENS de Lyon)*, École doctorale Phast, Advisor: Stéphane G. Roux.

2014 - 2015 **M2.Sc. in fundamental physics "Optics, Matter, Plasma: plasmas from space to laboratory"**, *Université Pierre et Marie Curie (Paris VI), Université Paris-Sud (Paris XI) et École Polytechnique*.

2010 - 2014 **Bachelor in physics**, *Universidad Autónoma de Madrid*.

Projects

2021-2024 **ANR Project SCALES**, *Statistical ChAracterization of multi-scaLE complex Systems with information theory*, P.I: C. Granero Belinchon.

2023-2025 **SAD-APRE Project MODELS**, *Multi-scale nOn-linear DEep-Learning strategies to enhance ocean Surface dynamics description*, P.I: C. Granero Belinchon.

Teaching

2015-2018 **École Normale Supérieure de Lyon**, *Fluid Physics and Signal Processing*.

2019-2020 **ISAE-SUPAERO: Institut Supérieur de l'Aéronautique et de l'Éspace**, *Applied Mathematics and Signal processing*.

2020-2021 **IMT Atlantique: École Mines-Télécom Bretagne-Pays de la Loire**, *Probability and Statistics ; Analysis, Signal processing and Automation ; Equations for physics of transfert ; Introduction to machine Learning ; Big data and cloud computing for oceanography*.

Supervision

2021-2024 **Daria Botvynko**, *PhD co-supervision: Deep Learning Representations for Lagrangian Dynamics at sea surface*, IMT Atlantique, Mercator Ocean Toulouse, ENIB.

2022-2025 **Ewen Frogé**, *PhD co-supervision: Characterization of causality relationships between the scales of turbulence*, IMT Atlantique, ENS de Lyon.

Administration

07/2016 **Contribution to the Statphys26 conference organisation**, *Lyon*.

Scientific production

- 18 publications in international peer-reviewed journals.
- 15 publications in conferences with peer-reviewed proceedings.
- 3 talks in schools and workshops.

1 Scientific publications

Image processing applications to remote sensing

1 Pierre-Etienne Brilouet, Dominique Bouniol, Fleur Couvreux, Alex Ayet, **Carlos Granero-Belinchon**, Marie Lothon and Alexis Mouche *Trade Wind Boundary Layer Turbulence and Shallow Precipitating Convection: New Insights Combining SAR Images, Satellite Brightness Temperature, and Airborne In Situ Measurements*, **Geophysical Research Letters, 50 (2023), e2022GL102180** (I.F. 4.72)(https://doi.org/10.1029/2022GL102180).

2 **Carlos Granero-Belinchon**, Stéphane G. Roux, Nicolas B. Garnier, Pierre Tandeo, Bertrand Chapron and Alexis Mouche *Two-dimensional structure functions for characterizing convective rolls in the marine atmospheric boundary layer from Sentinel-1 SAR images*, **Remote Sensing Letters, 13 (2022), 946–957** (I.F. 2.369)(https://doi.org/10.1080/2150704X.2022.2112107).

3 Aurélie Michel,**Carlos Granero-Belinchon**, Charlène Cassante, Paul Boitard, Xavier Briottet, Karine Adeline, Laurent Poutier, and José A. Sobrino *A New Material-Oriented TES for Land Surface Temperature and SUHI Retrieval in Urban Areas: Case Study over Madrid in the Framework of the Future TRISHNA Mission*, **Remote Sensing, 13(11) (2021), 5139** (I.F. 4.118) (https://doi.org/10.3390/rs13245139).

4 **Carlos Granero-Belinchon**, Karine Adeline, Xavier Briottet, *Impact of the number of dates and their sampling on a NDVI time series reconstruction methodology to monitor urban trees with Vens satellite*, **International Journal of Applied Earth Observation and Geoinformation, 95 (2021), 102257** (I.F. 4.650)(https://doi.org/10.1016/j.jag.2020.102257).

5 **Carlos Granero-Belinchon**, Aurélie Michel, Veronique Achard, Xavier Briottet, *Spectral unmixing for thermal infrared multi-spectral airborne imagery over urban environments: day and night synergy*, **Remote Sensing, 12(11) (2020), 1871** (I.F. 4.118)(https://doi.org/10.3390/rs12111871).

6 **Carlos Granero-Belinchon**, Karine Adeline, Aude Lemonsu, Xavier Briottet, *Phenological dynamics characterization of alignment trees with Sentinel-2 imagery: A vegetation indices time series reconstruction methodology adapted to urban areas*, **Remote Sensing, 12(4) (2020), 639** (I.F. 4.118)(https://doi.org/10.3390/rs12040639).

7 **Carlos Granero-Belinchon**, Aurélie Michel, Jean-Pierre Lagouarde, Jose Sobrino, Xavier Briottet, *Multiresolution study of thermal unmixing techniques over Madrid urban area: case study of TRISHNA mission*, **Remote Sensing, 11(10) (2019), 1251** (I.F. 4.118)(https://www.mdpi.com/2072-4292/11/10/1251).

8 **Carlos Granero-Belinchon**, Aurélie Michel, Jean-Pierre Lagouarde, Jose Sobrino, Xavier Briottet, *Night thermal unmixing for the study of microscale Surface Urban Heat Islands with TRISHNA-like data*, **Remote Sensing, 11(12) (2019), 1449** (I.F. 4.118)(https://www.mdpi.com/2072-4292/11/12/1449).

Information theory to study complex systems

9 **Carlos Granero-Belinchon**, Stéphane G. Roux, Nicolas B. Garnier, *Multiscale and anisotropic characterization of images based on complexity: An application to turbulence*, **Physica D: Nonlinear Phenomena, 459, 134027 (2024)** (I.F. 4) (https://www.sciencedirect.com/science/article/pii/S0167278923003810).

10 **Carlos Granero-Belinchon**, Stéphane G. Roux, Nicolas B. Garnier, *Quantifying non-stationarity with Information Theory*, **Entropy, 23(12), 1609 (2021)** (I.F. 2.738)
(https://www.mdpi.com/1099-4300/23/12/1609).

11 **Carlos Granero-Belinchon**, Stéphane G. Roux, Nicolas B. Garnier, *Information theory for non-stationary processes with stationary increments*, **Entropy, 21(12), 1223 (2019)** (I.F. 2.419) (https://doi.org/10.3390/e21121223).

12 **Carlos Granero-Belinchon**, Stéphane G. Roux, Patrice Abry, Nicolas B. Garnier, *Probing high order dependencies with information theory*, **IEEE Transactions on Signals Processing, 67(14), 3796-3805 (2019)** (I.F. 4.203) (https://ieeexplore.ieee.org/document/8727943).

13 **Carlos Granero-Belinchon**, Stéphane G. Roux, Nicolas B. Garnier, *Kullback-Leibler divergence measure of intermittency: application to turbulence*, **Physical Review E, 97 (2018), 013107** (I.F. 2.284) (https://journals.aps.org/pre/abstract/10.1103/PhysRevE.97.013107).

14 **Carlos Granero-Belinchon**, Stéphane G. Roux, Patrice Abry, Muriel Doret, Nicolas B. Garnier, *Information Theory to probe Intrapartum fetal Heart Rate Dynamics*, **Entropy, 19(12), 640 (2017)** (I.F. 2.305) (http://www.mdpi.com/1099-4300/19/12/640).

15 **Carlos Granero-Belinchon**, Stéphane G. Roux, Nicolas B. Garnier, *Scaling of information in turbulence*, **EPL (Europhysics letter), 115 (2016), 58003** (I.F. 1.957) (http://dx.doi.org/10.1209/0295-5075/115/58003).

Neural Network generation of stochastic fields with turbulent velocity statistics

16 **Carlos Granero-Belinchon**, *Neural network based generation of a 1-dimensional stochastic field with turbulent velocity statistics*, **Physica D: Nonlinear Phenomena, 458, 133997 (2024)** (I.F. 4) (https://www.sciencedirect.com/science/article/pii/S0167278923003512).

17 **Carlos Granero-Belinchon**, Manuel Cabeza Gallucci, *A multiscale and multicriteria generative adversarial network to synthesize 1-dimensional turbulent fields*, **Machine Learning: Science and Technology, 5(2), 025032 (2024)** (I.F. 6.8) (https://iopscience.iop.org/article/10.1088/2632-2153/ad43b3).

Materials of interest in renewable energy

18 M. Barawi, **C. Granero**, P. Díaz-Chao, C. V. Manzano, M. Martín-González, D. Jiménez-Rey, I. J. Ferrer, J. R. Ares, J. F. Fernández, C. Sánchez, *Thermal decomposition of non-catalysed MgH_2 films*, **International Journal of Hydrogen Energy, 39 (2014), 9865-9870** (I.F. 3.313) (http://dx.doi.org/10.1016/j.ijhydene.2014.01.030).

2 Communications in Congresses

Image processing applications to remote sensing

1 D. Botvynko (speaker), C. Granero-Belinchon, S. Van Gennip, A. Benzinou and R. Fablet, *Deep learning for Lagrangian drift simulation at the sea surface*, **Accepted in IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)**, 4-10 June 2023, Rhodes island, Greece.

2 B. M. Nguyen, G. Tian, M.-T. Vo, A. Michel, T. Corpetti and C. Granero-Belinchon (speaker), *Convolutional Neural Network Modelling for MODIS Land Surface Temperature Super-Resolution*, **30th European Signal Processing Conference (EUSIPCO)**, 29 August-02 September 2022, Belgrade, Serbia, pp. 1806-1810, Oral.

3 P.-E. Brilouet (speaker), D. Bouniol, F. Couvreux, A. Ayet, C. Granero-Belinchon, M. Lothon and A. Mouche, *Combining satellite and in situ data to investigate the marine atmospheric boundary-layer structure and trade-wind cumuli organization*, **EGU General Assembly**, 23-27 May 2022, Vienna, Austria, EGU22-10489, Oral.

4 S. Rama, J. Michel (speaker), V. Rivalland, A. Michel and C. Granero-Belinchon, *Assessing the usefulness of Land Surface Temperature spatial disaggregation for water stress mapping in the frame of the preparation of the Trishna mission*, **'6th International Symposium on Recent Advances in Quantitative Remote Sensing: RAQRSVI'**, 21-25 September 2022, Valencia, Spain, Poster.

5 C. Granero-Belinchon, X. Briottet (speaker), A. Michel, L. Roupioz, J.-P. Lagouarde and J. Sobrino, *Recent results in the estimation of urban land surface temperature for TRISHNA mission*, **'6th International Symposium on Recent Advances in Quantitative Remote Sensing: RAQRSVI'**, 21-25 September 2022, Valencia, Spain, Oral.

6 A. Michel (speaker), C. Granero-Belinchon and X. Briottet, *Mapping of urban land surface temperatures by the future THRISHNA mission: Focus on inversion and sharpening methods*, **EARSEL Joint Workshop Urban Remote Sensing**, 30 Mars - 01 April 2021, Liege, Belgium, Oral.

7 L. Roupioz (speaker), A. Michel, C. Granero-Belinchon and X. Briottet, *Current and future challenges in land surface temperature estimation over urban areas from upcoming high-resolution TIR satellite missions*, **Living Planet Symposium**, 13-17 May 2019, Milan, Italy, Oral.

8 A. Michel, L. Roupioz, C. Granero-Belinchon, J.-P. Lagouarde, J.A. Sobrino and X. Briottet (speaker), *Land Surface Temperature retrieval over urban areas from simulated TRISHNA data*, **JURSE**, 22-24 May 2019, Vannes, France, Oral, https://ieeexplore.ieee.org/document/8808979.

Information theory to study complex systems

9 C. Granero-Belinchón (speaker), S.G. Roux, N.B. Garnier, *Kullback-Leibler divergence measure of intermittency: application to turbulence*, **Entropy 2018**, Topic S6: Entropy in action (applications), 14-16 May 2018, Barcelone, Spain, Oral.

10 C. Granero-Belinchón, S.G. Roux (speaker), N.B. Garnier, *Un estimateur du taux d'entropie basé sur l'Information Mutuelle*, **Gretsi 2017**, Topic 1.3: Parcimonie et graphes, 05-08 September 2017, Nice, France, Poster.

11 C. Granero-Belinchón, S.G. Roux, N.B. Garnier, P. Abry (speaker), M. Doret, *Mutual Information for Intrapartum fetal Heart Rate Analysis*, **EMBC17**, Topic 1: Biomedical Signal Processing, 11-15 July 2017, JeJu Island, South Korea, Oral, https://ieeexplore.ieee.org/document/8037247.

12 C. Granero-Belinchón (speaker), S.G. Roux, N.B. Garnier, *Information scaling in fully developed turbulence*, **StatPhys26**, Topic 7: Nonlinear Physics, 18-20 July 2016, Lyon, France, Oral.

Materials of interest in renewable energy

13 C. Granero, C.V. Manzano, M. Martín-González, D. Jiménez-Rey, S. Yoda, M. Barawi, J. R. Ares (speaker), I. J. Ferrer, J. F. Fernández y C. Sánchez, *Descomposición de láminas delgadas de hidruro de magnesio sin catalizador*, **Bienal XXIV R.S.E.F**, 15-19 Juillet 2013, Valencia, Spain, Oral.

14 M. Barawi (speaker), C. Granero, C. V. Manzano, M. Martín-González, D. Jiménez-Rey, S. Yoda, J. R. Ares, I. J. Ferrer, J. F. Fernández and C. Sánchez, *Decomposition of magnesium hydride thin films without catalyst*, **EMRS-Fall meeting**, Symposium C: Nanostructured materials for solid state hydrogen storage, 16-20 September 2013, Warsaw, Poland, Poster.

15 J. F. Fernández (speaker), M. Ooro, C. Granero, D. Jiménez-Rey, A. Muoz-Martn, J. R. Ares, I. J. Ferrer and C. Sánchez, *Mg-Ti thin films as a play ground for Hydrogen absorption/desorption kinetic studies*, **EMRS-Fall meeting**, Symposium C: Nanostructured materials for solid state hydrogen storage, 16-20 September 2013, Warsaw, Poland, Oral.

Communications in workshops and schools

1 C. Granero-Belinchón (speaker), S.G. Roux, N.B. Garnier, *What is the meaning of transfer entropy measures?*, **VII GEFENOL Summer School on Statistical Physics of Complex Systems**, 19-30 Juin 2017, Palma de Mallorca, Spain, Oral.

2 C. Granero-Belinchón (speaker), S.G. Roux, N.B. Garnier, *What is the meaning of transfer entropy measures?*, **VII GEFENOL Summer School on Statistical Physics of Complex Systems**, 19-30 Juin 2017, Palma de Mallorca, Spain, Poster.

3 C. Granero-Belinchón (speaker), S.G. Roux, N.B. Garnier, *Multiscale information transfer in turbulence*, **Mediterranean School and Workshop of Complex Networks**, 28 Août-3 Septembre 2016, Sicily, Italy, Oral.