

# Javier Rasero

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**Research Interest** Machine Learning, Statistics, Computational Neuroimaging, Health Neuroscience, Brain Connectivity, Physics, Information Theory, Brain Dynamics.

**Updated Biosketch** I am a physicist interested in the application of statistical and machine learning methods to biomedical data, especially in the neuroimaging field. I got my Ph.D. in 2014 at the University of Valencia on model building and statistical testing with experimental data from the primordial Universe, paying special attention to Inflationary physics. After a short period working as developer for 3D applications, I decided to move to the neuroimaging field to do research, where I have in particular developed an unsupervised machine learning method for studying brain disorder groups using connectivity matrices and studied the correspondence between task and resting paradigms in fMRI using deep neural networks. I am currently devoted to the growth of Health Neuroscience, a new promising field concerned with the interplay between the brain and physical health over the lifespan.

**Professional Experience**

**2019 - Present** Postdoctoral Researcher. Cognitive Axon (CoAx) Lab. Department of Psychology. Carnegie Mellon University (USA). Principal Investigator: Prof. Timothy Verstynen

**2018 - 2019** Postdoctoral Researcher. Computational Neuroimaging Laboratory. Biocruces Health Research Institute. Hospital Universitario de Cruces (Spain). Principal Investigator: Prof. Jesus M. Cortes

**2016 - 2018** Postdoctoral Researcher. Department of Physics. University of Bari (Italy). Principal Investigator: Prof. Sebastiano Stramaglia

**2015 - 2016** C++ Developer. 3DKumo. Innovation Association Bilbao (Spain)

**2009 - 2014** PhD Student. Department of Theoretical Physics. University of Valencia (Spain). Supervisor: Prof. Gabriela Barenboim

**Education** **2014**, June. Ph D. in Physics. Mention of *DOCTOR EUROPEUS*. University of Valencia (Spain)

- Dissertation Title: "Implications of non standard scenarios in Cosmology and the Very Early Universe"
- Supervisor: Gabriela Barenboim
- Mark: Sobresaliente Cum Laude

2009, June. M. Sc. in Advanced Physics. University of Valenncia (Spain)  
2003 - 2008 Degree in Physics. University of Basque Country (Spain)

### Publications in Preparation

2. Antonio Jimenez-Marin, Diego Rivera, Victoria Boado, Ibai Diez, Fermín Labayen, Irati Garrido, Daniela Ramos-Usuga, Javier Rasero, Alberto Cabrera, Sebastiano Stramaglia, Juan Carlos Arango-Lasprilla, Jesus M Cortes. Hyperconnectivity of the default mode network in multiorgan dysfunction syndrome. **Biorxiv**, 2018 <https://doi.org/10.1101/418160>
1. Arrate Sevilla Mambrilla, Celia Morales, Pilar A Ezkurra, Javier Rasero, Verónica Velasco, Goikoana Cancho, Karmele Mujika, Cristina Penas, Isabel Smith, Isabel Smith, Aintzane Asumendi, Jesús M Cortés, María Dolores Boyano and Santos Alonso. VRAF V600E mutational loads as a prognosis biomarker in malignant melanoma.

### Submitted Publications

3. Peter J. Gianaros, Thomas E. Kraynak, Dora C-H Kuan, James J. Gross, Kateri McRae, Ahmad R. Hariri, Stephen B. Manuck, Javier Rasero, Timothy D. Verstynen. Affective brain patterns as multivariate neural correlates of cardiovascular disease risk. Submitted to **Social Cognitive and Affective Neuroscience**.
2. Javier Rasero, Diego Rivera, Reza Mohammadi, Ernst Wit, Jesus M Cortes, Juan Carlos Arango-Lasprilla. The usefulness of Bayesian graphical modelling with neuropsychological data. Submitted to **Assessment**. PsyArxiv, 2019 <https://doi.org/10.31234/osf.io/8cr2f>.
1. Filippo Mancuso\*, Sergio Lage\*, Javier Rasero\*, José Luis Díaz-Ramón, Aintzane Apraiz, Gorka Pérez-Yarza, Pilar Ezkurra, Cristina Penas, Ana Sánchez-Diez, María Dolores García-Vazquez, Jesús Gardeazabal, Rosa Izu, Karmele Mujika, Jesús Cortés, Aintzane Asumendi, María Dolores Boyano. A new clinical tool to predict outcome in early-stage melanoma patients. (\*equally first author contributions). Submitted to **Scientific Reports**. Biorxiv, 2019 <https://doi.org/10.1101/632455>.

### Publications

13. Natalia Lozovaya, Romain Nardou, Toman Tyzio, Morgane Chiesa, Alexandre Pons-Bennaceur, Sanaz Eftekhari, Thi-Thien Bui, Maxime Billon-Grand, Javier Rasero, Paolo Bonifazi, Jean-Luc Gaiarsa, Diana Ferrari and Yehezkel Ben-Ari. Early alterations in a mouse model of Rett syndrome: the GABA developmental shift is abolished at birth. **Scientific Reports** 9 (1), 9276. 2019
12. Javier Rasero, Teresa Creanza, Nicola Ancona, Jesus M. Cortes, Daniele Marinazzo and Sebastiano Stramaglia. Consensus clustering approach for genome-wide association studies. Chapter in **Advances on Non-linear Dynamics of Electronic Systems** book. pp 116-120, 2019.

11. Javier Rasero, Ibai Diez, Jesus M Cortes, Daniele Marinazzo and Sebastiano Stramaglia. Connectome sorting by Consensus Clustering increases separability in group neuroimaging studies. **Network Neuroscience** 3 (2), 325-343. 2018
10. Javier Rasero, Hannelore Aerts, Marlis Ontivero Ortega, Jesus M. Cortes, Sebastiano Stramaglia and Daniele Marinazzo. Predicting functional networks from region connectivity profiles in task-based versus resting-state fMRI data. Included in **PLOS collection: "Machine Learning in Health and Biomedicine"**. **PLOS ONE** 13(11): e0207385, 2018.
9. Maria Lasalvia, Giuseppe Perna, Lorenzo Manti, Javier Rasero, Sebastiano Stramaglia and Vito Capozzi. Raman spectroscopy monitoring of MCF10A cells irradiated by protons at clinical doses. **International journal of radiation biology** 95 (2), 207-214. 2018
8. Borja Camino-Pontes, Ibai Diez, Antonio Jimenez-Marin, Javier Rasero, Asier Erramuzpe, Paolo Bonifazi, Sebastiano Stramaglia, Stephan Swinnen, Jesus Corte. Interaction information along lifespan of the resting brain dynamics reveals a major redundant role of the default mode network. **Entropy**. 20(10), pp 742, 2018.
7. Javier Rasero, Nicola Amoroso, Marianna La Rocca, Sabina Tangaro, Roberto Bellotti and Sebastiano Stramaglia. Multivariate regression analysis of structural MRI connectivity matrices in Alzheimer's disease. **PLOS ONE** 12(11): e0187281, 2017.
6. Javier Rasero, Mario Pellicoro, Leonardo Angelini, Jesus M Cortes, Daniele Marinazzo and Sebastiano Stramaglia. Consensus clustering approach to group brain connectivity matrices. **Network Neuroscience**. 1-3, pp.242-253, 2017.
5. Javier Rasero, Carmen Alonso Montes, Ibai Diez, Laiene Olabarrieta-Landa, Lakhdar Remaki, Iaki Escudero, Beatriz Mateos Goi, Paolo Bonifazi, Manuel Fernandez Martinez, Juan Carlos Arango-Lasprilla, Sebastiano Stramaglia and Jesus Cortes. Group-Level Progressive Alterations in Brain Connectivity Patterns Revealed by Diffusion-Tensor Brain Networks across Severity Stages in Alzheimer's Disease. **Frontiers in Aging Neuroscience**. 9, pp.215-215. ISSN 1663-4365, 2017
4. Richard Easter, Laynce C. Price, Javier Rasero\*\*\*. 2014. Inflating an inhomogeneous universe. **Journal Of Cosmology And Astroparticle Physics (JCAP)**. 2014-8, pp.41. ISSN 1475-7516. \*\*\*(In alphabetical order).
3. Gabriela Barenboim, Javier Rasero\*\*\*. 2014. Structure Formation during an early period of matter domination. **Journal of high energy physics (JHEP)**. 2014-4, pp.138. ISSN 1126-6708. \*\*\*(In alphabetical order).
2. Gabriela Barenboim, Javier Rasero\*\*\*. 2012. Electroweak baryogenesis window in non standard cosmologies. **Journal of high energy physics (JHEP)**. 2012-7, pp.28. ISSN 1126-6708. \*\*\*(In alphabetical order).

1. Gabriela Barenboim, Javier Rasero\*\*\*. 2011. Baryogenesis from a right-handed neutrino condensate. **Journal of high energy physics (JHEP)**. 2011-3, pp.097. ISSN 1126-6708. \*\*\*(In alphabetical order).

## Research Projects

- 2018-Present.** Neurobiology of Adult Health (NOAH). Principal Investigator: Peter J. Gianaros. National Institutes of Health (USA).
- 2017-2018.** Multidisciplinary investigation for malign melanoma II. Principal Investigator: Lola Boyano. ELKARTEK Industry, Basque Government. Reference ID: KK-2017/00041. Budget: 276.548 €.
- 2017-2018** Research on Malign Melanoma: Validation and development of new biomarkers for diagnosis, prognosis and treatment of the melanoma. Principal Investigator: Lola Boyano (University of Basque Country). RIS3, Health Department of Basque Country. Reference ID: 222020. Budget: 96.061 €.
- 2016-2017** Multidisciplinary investigation for malign melanoma. Principal Investigator: Lola Boyano (University of Basque Country). ELKARTEK Industry, Basque Government. Reference ID: KK-2016/00036, Budget: 216.964 €.
- 2008-2014** Interacciones Fundamentales y sus implicaciones experimentales. Principal Investigator: Francisco J. Botella Olcina. (University of Valencia) Ministerio de educacion y ciencia. Plan nacional investigación científica, desarrollo e innovación tecnológica.
- 2008-2009** Proyecto Prometeo, De la Física del LHC a las claves del universo primordial. Principal Investigator: Jose Bernabeu Arberola. (University of Valencia). Valencian Government.

## Talks, Seminars and Posters

10. **January 2019.** *Application of Machine Learning and Advanced Statistics methods to the study of Melanoma Prognosis.* Talk. Workshop sobre investigación multidisciplinar en melanoma maligno. Leioa (Spain)
9. **May 2018.** *Predicting functional networks from region connectivity profiles in task-based versus resting-state fMRI data and its possible applications to brain tumor data.* Talk. European Network for Brain Imaging of Tumors (ENBIT). Brussels (Belgium)
8. **July 2017.** *Consensus clustering approach to group brain connectivity matrices.* Poster. First International Summer Institute on Network Physiology (ISINP). Como (Italy)
7. **February 2017.** *Consensus clustering approach to group brain connectivity matrices.* Talk. Third BCAM Workshop on Quantitative Biomedicine for Health and Disease. Bilbao (Spain)
6. **December 2016.** *Multivariate methods in machine learning: state of art, challenges and possible applications to melamics data.* Talk. MELAMICS workshop. Plentzia (Spain)
5. **December 2016.** *Consensus clustering approach to group brain connectivity matrices.* Poster. BrainModes 2016. Brussels (Belgium)
4. **March 2015.** *Deep Neural Networks in Biomdecine.* Talk. Biocruces Health Research Institute. Barakaldo (Spain)

3. **April 2013.** *Electroweak baryogenesis window in non standard cosmologies.* Talk. Korea Advanced Institute of Science and Technology (KAIST). Daejeon (South Korea)
2. **July 2012.** *Electroweak baryogenesis window in non standard cosmologies.* Talk. The LHC, Particle Physics and Cosmos Workshop. University of Auckland (New Zealand)
1. **May 2012.** *Baryogenesis, Dark Matter and Axions from a minimal cosmological supersymmetric model.* Talk. Department of Theoretical Physics. University of Basque Country. Leioa (Spain)

**Teaching Experience**

**2019** University of Basque Country. Analysis, prediction and classification of biomedical data. MSc in Biomedical Research. <https://jrasero.github.io/curso-scikit-ehu-2019/> (in Spanish).  
**2018** University of Basque Country. Analysis, prediction and classification of biomedical data. MSc in Biomedical Research.  
**2012-2013** University of Valencia. Fundamental Physics I. Degree in Chemistry.

**Relevant skills**

*Languages:* English (C1 Advanced CAE), Italian (B1), Basque (C1). Spanish (Mother Tongue).  
*Programming Languages:* Python, R, C++, Matlab, Mathematica.  
*Specific Libraries and toolboxes:* scikit-learn, keras, nilearn, FSL, nipy, caret, weka.

**References**

**Prof. Timothy Verstynen.** Cognitive Axon (CoAx) Lab. Carnegie Mellon University (USA). [timothyv@andrew.cmu.edu](mailto:timothyv@andrew.cmu.edu)  
**Prof. Jesus M. Cortes.** Computational Neuroimaging Lab. Biocruces Health Research Institute (Spain). [jesus.m.cortes@gmail.com](mailto:jesus.m.cortes@gmail.com)  
**Prof. Sebastiano Stramaglia.** Department of Physics. University of Bari (Italy) [sebastiano.stramaglia@ba.infn.it](mailto:sebastiano.stramaglia@ba.infn.it)  
**Dr. Daniele Marinazzo.** Department of Data Analysis. University of Ghent (Belgium). [daniele.marinazzo@ugent.be](mailto:daniele.marinazzo@ugent.be)  
**Prof. Gabriela Barenboim.** Department of Theoretical Physics. University of Valencia (Spain). [Gabriela.Barenboim@uv.es](mailto:Gabriela.Barenboim@uv.es)