Curriculum Vitae of Lorenzo Fontolan, Ph.D.

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Current Position

2015 - present	**Research Scientist at Janelia Research Campus, HHMI**. Group Leader: *Dr. Sandro Romani.*

Education

2011 - 2015	**Ph.D. in Neuroscience** at University of Geneva and ENS Paris Thesis title: 'Encoding speech through brain rhythms'. Advisors: *Prof. Anne-Lise Giraud and Prof. Boris Gutkin.*
2011	**Master Degree in Physics *summa cum laude*** La Sapienza Università di Roma.
2011	**Master Thesis** at Center for Theoretical Neuroscience, Columbia University of New York. Title: 'Learning of hierarchical memories with binary synapses'. Advisors: *Prof Enzo Marinari, Prof. Stefano Fusi.*
2007	**Bachelor Degree in Physics** La Sapienza Università di Roma, Thesis title: 'Infrared Reflectance of V_2O_3 Crystal'.
2003	**Diploma di Maturità (High School Degree)** Liceo Classico E.Q. Visconti, Roma.

Awards

Amicitia Excellence Prize 2015, *Best Ph.D. thesis in Neuroscience*

Publications

1. *Neural algorithms and circuits for motor planning.* Inagaki H, Chen S, Daie K, Finkelstein A, **Fontolan L**, Romani S, Svoboda K (2022). Annu Rev Neurosci (accepted)

2. *Attractor dynamics gate cortical information flow during decision-making.* Finkelstein* A, **Fontolan* L**, Economo M, Li N, Romani S, Svoboda K (2021). Nat Neurosci, 24, 843-850. **equal contribution*

3. *Discrete attractor dynamics underlying selective persistent activity in frontal cortex.* Inagaki H, **Fontolan L**, Romani S, Svoboda K (2019). Nature, 566: 212-217.

4. *Theta- and beta-band neural activity reflect independent syllable tracking and intelligibility of time-compressed speech.* Pefkou M, Arnal L, **Fontolan L**, Giraud AL (2016). J Neurosci, 37: 7930-7938.

5. *Neural cross-frequency coupling: From mechanisms to functions.* Hyafil A, Giraud AL, **Fontolan L**, Gutkin B (2015). Trends Neurosci, 2015;38: 725-740.

6. *Speech encoding by coupled cortical theta and gamma oscillations.* Hyafil A, **Fontolan L**, Kabdebon C, Gutkin B, Giraud AL (2015). eLife, 10.7554/eLife.06213.

7. *The contribution of frequency-specific activity to hierarchical information processing in the human auditory cortex.* **Fontolan L**, Morillon B, Liegeois-Chauvel C, Giraud AL (2014). Nat Commun, 5(May), 4694.

8. *Analytical insights on theta-gamma coupled neural oscillators.* **Fontolan L**, Krupa MP, Hyafil A, Gutkin B (2013). J Math Neurosci, 3:16.

9. Book Chapter: *Neuroscienziati alla ricerca dell'Io* (in Italian), Hoepli Editore (in preparation).

Talks and Presentations

- *Dynamic attractors shape neural activity during motor planning* (2021). University of Oregon, USA.
- *Dynamic attractors shape neural activity during motor planning* (2021). Rice University, USA.
- *Neural circuit dynamics underlying short-term memory in frontal cortex* (2019). NJIT, USA.
- *Neural circuit dynamics underlying short-term memory in frontal cortex* (2019). Brandeis University, USA.
- *Neural circuit dynamics underlying short-term memory in frontal cortex* (2019). IDIBAPS Barcelona, Spain.
- *Neural circuit dynamics underlying short-term memory in frontal cortex* (2019). ENS Paris, France.
- *Neural circuit dynamics underlying short-term memory in frontal cortex* (2019). University of Padua, Italy.
- *A simple model of Theta-Gamma coupling* (2015). International Conference on Mathematical Neuroscience, France.
- *The contribution of frequency-specific activity to hierarchical information processing in the human auditory cortex* (2014). Nanosymposium at the Society for Neuroscience Annual Meeting, Washington DC, USA.
- *Inference with cortical rhythms in auditory cortex: the role of oscillations and predictive coding* (2014). Predictive coding and oscillations workshop, Geneva, Switzerland.
- *The role of oscillations in auditory cortex* (2012). Institut de Neurosciences de la Timone, Marseille, France.

- *A nested theta-gamma oscillators network for parsing speech* (2011). Brhycoco Meeting, NYU, USA.
- *Learning of hierarchical memories with binary synapses* (2010). IDIBAPS Barcelona, Spain.

Conference Abstracts

- **Fontolan** L, Finkelstein A, Economo M, Li N, Romani S, Svoboda K (2020). *Attractor dynamics gate cortical information flow during decision-making.* CoSyNe, Denver, USA.
- **Fontolan** L, Inagaki H, Romani S, Svoboda K (2018). *Discrete attractors underlie preparatory activity in rodent frontal cortex.* CoSyNe, Denver, USA.
- **Fontolan** L, Inagaki H, Romani S, Svoboda K (2017). *Models for short-term memory in a motor preparation task.* Society for Neuroscience Annual Meeting, Washington DC, USA.
- **Fontolan** L, Krupa M, Romani S, Gutkin B (2015). *A simple model of Theta-Gamma coupling.* Society for Neuroscience Annual Meeting, Chicago, USA.
- **Fontolan** L, Morillon B, Liegeois-Chauvel C, Giraud AL (2014). *Frequency specific activity in human auditory cortex.* Gordon Research Conference on Neurobiology of Cognition, Maine, USA.
- **Fontolan** L, Giraud AL (2014). *Scale-free dynamics during listening: a signature for impairment?* Gordon Research Seminar on Neurobiology of Cognition, Maine, USA.
- **Fontolan** L, Olasagasti I, Giraud AL (2014). *Inference with cortical rhythms in auditory cortex: the role of oscillations and predictive coding..* Alpine Brain Imaging Meeting, Champery, Switzerland.
- **Fontolan** L, Krupa M, Hyafil A, Giraud AL, Gutkin B (2013). *Dynamics of coupled theta-gamma neural oscillators.* Society for Neuroscience Annual Meeting, San Diego, USA.
- **Fontolan** L, Hyafil A, Kabdebon C, Gutkin B, Giraud AL (2013). *Cortical theta and gamma oscillations as viable instruments of speech segmentation.* Lemanic Neuroscience Annual Meeting, Les Diablerets, Switzerland.
- **Fontolan** L, Morillon B, Liegeois-Chauvel C, Giraud AL (2013). *The contribution of frequency-specific activity to hierarchical information processing in human auditory cortices.* European Neuroscience Conference, Bordeaux, France.
- **Fontolan** L, Morillon B, Liegeois-Chauvel C, Giraud AL (2013). *Frequency-specific contributions to hierarchical information processing in human auditory cortices.* Swiss Society for Neuroscience. Geneva, Switzerland.
- **Fontolan** L, Morillon B, Liegeois-Chauvel C, Giraud AL (2013). *Frequency-specific contributions to hierarchical information processing in human auditory cortices.* Alpine Brain Imaging Meeting. Champery, Switzerland.
- **Fontolan** L, Liegeois-Chauvel C, Morillon B, Giraud AL (2012). *Oscillation-based predictive mechanisms in speech processing revealed by intracranial EEG.* iEEG and Emotions Conference. Geneva, Switzerland.

- **Fontolan** L, Liegeois-Chauvel C, Morillon B, Giraud AL (2012). *Distinct contribution of gamma and beta activity to hierarchical message-passing in auditory cortices.* 4th International Conference on Auditory Cortex. Lausanne, Switzerland.
- Hyafil A, **Fontolan** L, Gutkin B, Giraud AL (2012). *A theoretical exploration of speech/neural oscillation alignment for speech parsing.* 4th International Conference on Auditory Cortex. Lausanne, Switzerland.
- **Fontolan** L, Hyafil A, Gutkin B, Giraud AL (2012). *Dynamics of interacting neural oscillators.* Neurodynamics: a workshop on heterogeneity, noise, delays, and plasticity in neural systems. Edinburgh, UK.
- Hyafil A, **Fontolan** L, Gutkin B, Giraud AL (2011). *A nested theta-gamma oscillators network for parsing speech.* Champalimaud Neuroscience Symposium, Lisboa, Portugal.

Academic and Professional activities

2021	Organizer, Bernstein symposium 'Control mechanisms for contextual computations and behavior'. Berlin, Germany
2020	Content Reviewer, 1st Neuromatch academy school in computational neuroscience.
2019	Speaker, Venice Summer School in Computational and Theoretical Models in Neuroscience.
2017	Creator, scientific exhibition on AI and Neuroscience 'WHAT? Machines that learn'.
2014	Co-organizer, Predictive Coding and Oscillations Workshop. Geneva, Switzerland.
2012	Co-organizer, Paris Area Computational Neuroscience Day. Paris, France.
2005-2007	Organizer and moderator of two scientific outreach seminars at the Physics Department of La Sapienza University of Rome, Italy.
2001 - 2003	National Representative at the Italian Forum for Students Associations, the youth assembly of the Italian Secretary of Education.

Reviewed for:
Nature Neuroscience, *Nature Publishing Group.*
Neuron, *Cell Press.*
Physical Review X, *American Physical Society.*
Proceedings of the National Academy of Sciences, *United States National Academy of Sciences.*
Plos Computational Biology *Public Library of Science.*
Cortex, *Elsevier.*
Communications Biology, *Nature Publishing Group.*
Neurons behav. data anal. theory, *The neurons, behavior, data analysis and theory collective.*
Computers in Biology and Medicine, *Elsevier.*
Language, Cognition and Neuroscience, *Taylor & Francis.*

Programming Skills

Programming languages: *C*, *Python*, *Matlab*, *Mathematica*, *XPP*.

Experience with Machine Learning libraries (Tensorflow, Theano, PyTorch) applied to Recurrent Neural Networks.

GitHub page: *github.com/fontolanl*

Languages

Italian	native tongue.
English	fluent writing, reading and speaking.
French	fluent writing, reading and speaking.
Spanish	functional reading, speaking and writing.

Teaching and Mentoring

2021	Mentor, 2nd Neuromatch academy school in computational neuroscience.
2019	Organizer and lecturer for the course *Mathematical methods for neuroscience and machine learning* at Janelia Research Campus.
2019	Guest Lecturer at General Philosophy course (Catholic University of America).
2017 - 2019	Lecturer 'Introduction to Computational Neuroscience' for Biology students at the American University and George Washington University.
2015	Thesis Supervisor, 'Isomorphism of Hopfield nets and Ising model' B. Sc. in Physics, La Sapienza University of Rome.
2006-2009	Tutor - college level physics and mathematics.

Academic and Professional Training

2019	NIH grant writing workshop at Janelia Research Campus.
2017	Scientists Teaching Science pedagogy course, tought by Prof. Barbara Houtz (NIH). The course aims at preparing postdocs for teaching STEM in university and college level classes.
2016	Methods in Computational Neuroscience Summer School Marine Biological Laboratory, Woods Hole, USA.
2003	Internship at Radius Ventures LLC, a NYC based venture capital firm focused on leading-edge health and life sciences start-ups.