Davide Zoccolan, PhD
Curriculum Vitae

Contact

Visual Neuroscience Lab
Neurobiology and Cognitive Neuroscience Sectors
International School for Advanced Studies (SISSA)
Via Bonomea 265
34136, Trieste (ITALY)

Office: +39 040 3787 701
Lab: +39 040 3787 723
Fax: +39 040 3787 702
Email: zoccolan@sissa.it
Web Site: http://www.sissa.it/~zoccolan/

Education

Oct 2002: **International School for Advanced Studies** Trieste, Italy
Ph.D. in Biophysics (Summa cum Laude)
Thesis: *A multidisciplinary study of neural coding underlying sensory-motor responses in the leech* (supervisor: Vincent Torre).

Nov 1997: **University of Turin** Turin, Italy
Laurea (*M.S. equiv.*) in Physics (grade 110/110)
Thesis: *A model of self-limiting synaptic growth in self-organizing neural networks* (supervisor: Mario Ferraro).

Employment

Present Appointments

International School for Advanced Studies Trieste, Italy
Since Dec 20, 2021: Full Professor of Physiology (05/D1), Neuroscience Area
Since Oct 2020: Coordinator, PhD Program in Cognitive Neuroscience
Since July 2015: Head, Committee for Animal Care (Organismo Preposto al Benessere Animale)
Since Feb 2009: Head, Visual Neuroscience Lab
[the lab investigates the neuronal basis of visual perception through neurophysiological and psychophysical experiments in rodents, as well as computational models and machine learning approaches].

Previous Appointments

Feb 2009 – Dec 2021 **International School for Advanced Studies** Trieste, Italy
- since March 16, 2021: Associate Professor in Physiology (05/D1), Neuroscience Area
- since July 20, 2015: Associate Professor in Psychobiology and Physiological Psychology (11/E1), Neuroscience Area.
- since Feb 1, 2009: Assistant Professor (*ricercatore t.d.*) in Physiology (05/D1), Neuroscience Area

Jul 2008 – Jan 2009: **Harvard University** Cambridge, MA, USA
Postdoctoral Fellow, Rowland Institute at Harvard.
Advisor: David Cox
Developed the laboratory rat as a model to study the neuronal basis of visual object recognition.

Jul 2003 – June 2008: **Massachusetts Institute of Technology** Cambridge, MA, USA
Postdoctoral Associate, McGovern Institute for Brain Research.
Advisors: James DiCarlo and Tomaso Poggio
Studied the neuronal basis of visual object recognition in primates and rats using a

combination of psychophysics, computational modeling and single unit-recordings from high-level cortical visual areas (e.g., inferotemporal cortex).

Nov 2002 – May 2003: **International School for Advanced Studies** Trieste, Italy
Research Fellow, Biophysics Sector.
Advisor: Vincent Torre
Investigated statistics of decision making and trajectory selection in freely moving leeches.

Nov 1998 – Oct 2002: **International School for Advanced Studies** Trieste, Italy
Ph.D. Student, Biophysics Sector.
Advisor: Vincent Torre
Investigated distributed motor pattern underlying reflexive behavior in the leech through multiple intracellular and extracellular recordings and quantitative analysis of motor behavior.

Mar – Aug 1998: **Polytechnic School of Turin** Turin, Italy
Research Fellow, Department of Physics.
Advisor: Pier Paolo Delsanto
Developed numerical simulations for parallel computers to study the interaction between ultrasonic surface waves and subsurface flaws in thin plates.

Nov 1996 – Nov 1997: **University of Turin** Turin, Italy
Undergraduate Thesis, Department of Experimental Physics.
Advisor: Mario Ferraro
Developed models of self-organizing artificial neural networks to simulate the properties of neuronal receptive fields in early visual areas.

Research Grants

2022: **Simons Foundation Autism Research Initiative (SFARI) – Autism Rat Models Consortium**
Visual cortical processing in autism: perceptual and neurophysiological alterations in a mutant rat model of autism spectrum disorder
180,000 euro

2021: **Beneficentia Stiftung Grant**
Visual perceptual and neurophysiological dysfunctions in rodent models of Autism Spectrum Disorder
50,000 euro

2019: **ERC Proof of Concept Grant**
SMARTLABCAM - *Engineering and commercialization of a smart camera with on-chip image processing for head- and eye-tracking in laboratory animals*
150,000 euro

2014: **ERC Consolidator Grant**
LEARN2SEE - Invariant visual object representations in the early postnatal and adult cortex: bridging theory, model and neurobiology
2,000,000 euro

2013: **FVG-R2B: Ricerca per la competitivita' dell'impresa**
Point of view – head-mounted mini-telecamera (Studio preliminare per la realizzazione di una minitelecamera per il monitoraggio dell'esplorazione visiva in animali da laboratorio).
12,000 euro

2013: **HFSP Program Grant 2013**

Neuroscience of knowledge: neural representation of concepts and their role in perception and memory.
450,000 USD per year for a team of 5 members: Winrich Freiwald (coordinator; The Rockefeller University), Mathew Diamond (SISSA), Rodrigo Quian Quiroga (University of Leicester), Haim Sompolinsky (The Hebrew University) and Davide Zoccolan (SISSA). Total for 3 years: **225,000 USD** to Zoccolan's lab @ SISSA.

2011: **Young SISSA Scientist Grant 2011**
Neuronal substrates underlying multimodal object recognition in rats.
50,000 euro

2010: **Marie Curie International Reintegration Grant**
IVOR - Neuronal substrates of invariant visual object recognition in rats.
25,000 euro per year; total for 4 years: **100,000 euro**

2009: **Compagnia di San Paolo: Programma Neuroscienze 2008/2009**
Experimental and theoretical investigation of neuronal processing of visual objects in a rodent model.
99,000 euros for a tema of two members: Davide Zoccolan (coordinator; SISSA) and Riccardo Zecchina (Politecnico di Torino) – **49,500 euro** to Zoccolan's lab @ SISSA.

2008: **Accademia Nazionale dei Lincei – Compagnia di San Paolo grant**
The rat as a novel model for understanding visual object recognition.
100,000 euros per year; total for 3 years: **300,000 euro**

Awards and Fellowships

2006: Charles A. King Trust Postdoctoral Research Fellowship

2003: HFSP Long Term Postdoctoral Fellowship

1998: Ph.D. Scholarship from the Italian Minister of University and Scientific Research

Student and Postdoctoral Supervision

Ph.D. students supervised (primary advisor role)

- Laura Porta (PhD candidate, 2021 – in progress)
- Angelina Tadic (PhD candidate, 2020 – in progress)
- Paolo Muratore (PhD candidate, 2019 – in progress)
- Riccardo Caramellino (PhD candidate, 2018 – in progress)
- Mattia Zanzi (PhD candidate, 2018 – in progress)
- Giulio Matteucci. *Multidisciplinary investigation of shape and motion processing in the rat visual cortex.* Supervised 2016 – 2020 (PhD granted Feb 2020).
  Next position: Postdoctoral Fellow, Department of Basic Neurosciences, University of Geneva (Switzerland)
- Liviu Soltuzu. *Representation of natural movies in rat visual cortex.* Supervised 2013 – 2018 (PhD granted Jan 2018).
  Next position: Data Scientist, Blue Brain Project, Membrane Systems Group, EPFL, Lausanne (Switzerland)
- Eis Ennavini. *Functional evidence of hierarchical object processing in rat lateral extrastriate cortex.* Supervised 2013 – 2018 (PhD granted Jan 2018).
  Next position: Postdoctoral Fellow, Institute of Basic Molecular Science, University of Oslo (Norway)

- Vladimir Djurdjevic. *Accuracy of Rats in Discriminating Visual Objects Is Explained by the Complexity of Their Perceptual Strategy.* Supervised 2012 – 2017 (PhD granted Nov 2017)
  Next position: Postdoctoral Fellow, Institute for Cognitive Neuroscience, Higher School of Economics, Moscow (Russian Federation)
- Alessandro Di Filippo. *Perceptual strategies and neuronal underpinnings underlying pattern recognition through visual and tactile sensory modalities in rats.* Supervised 2010 – 2015 (PhD granted May 2015).
  Next position: Postdoctoral Fellow, Center for Discovery Brain Sciences, University of Edinburgh (Scotland)
- Sina Tafazoli. *Behavioral and neuronal substrates of invariant object recognition in rats.* Supervised 2009 – 2014 (PhD granted Mar 2014).
  Next position: Postdoctoral Fellow, Princeton Neuroscience Institute, Princeton University (USA)
- Federica Rosselli. *A multidisciplinary approach to the study of shape and motion processing and representation in rats.* Supervised 2009 – 2014. (PhD granted Mar 2014).
  Next position: Postdoctoral Fellow, Center of Advanced European Studies and Research - Caesar, An Institute of the Max-Planck Society, Bonn (Germany)
- Alireza Alemi-Neissi. *Shape Processing Strategies Underlying Visual Object Recognition.* Supervised 2009 – 2013 (PhD granted Jan 2013).
  Next position: Postdoctoral Fellow, Physics Department, Politecnico di Torino (Italy)

Bachelor & master students supervised (primary advisor role)

- Daria Ricci (University of Trieste), fall 2021 – spring 2022
- Silene Fornasaro (University of Trento), fall 2020 – fall 2021
- Valeriya Zelenkova (University of Trento), fall 2020 – fall 2021
- Daniel Caproni (University of Torino), fall 2019 – fall 2020
  Next position: Post-laurea fellowship, SISSA, Italy
- Andrea Buccellato (University of Trieste), fall 2019 – fall 2020
  Next position: PhD student, University of Padova, Italy
- Antonella Torrisi (University of Trieste), fall 2018 – fall 2019
- Benedetta Zattera (University of Trento), fall 2017 – fall 2018
  Next position: PhD student, University of Torino, Italy
- Ilaria Montano (University of Trieste), fall 2017 – fall 2018
  Next position: PhD student in Life Sciences, Hong Kong University of Science and Technology (China)
- Riccardo Caramellino (University of Torino), fall 2016 – fall 2017
  Next position: PhD student, SISSA, Italy
- Marco Salluzzo (University of Trieste), fall 2016 – fall 2017
  Next position: PhD student, Institute of Neurophysiology (CNR-Pisa), University of Firenze, Italy.
- Giulio Matteucci (University of Torino), fall 2015 – fall 2016
  Next position: PhD student, SISSA, Italy
- Simone Vigano' (University of Trento), fall 2014 – fall 2015
  Next position: PhD student, Center for Mind/Brain Sciences (CIMeC), University of Trento, Rovereto, Italy
- Mattia Orru' (University of Trieste), fall 2014 – fall 2015
- Luca Godenzini (University of Trieste), fall 2013 – fall 2014
  Next position: PhD student, Florey Institute of Neuroscience and Mental Health, University of Melbourne, Australia

- Silvia Rossi (University of Trento), fall 2012 – fall 2013
  Next position: Student of medicine, University of Vercelli, Italy
- Laura Riontino (University of Trieste), 2013
  Next position: PhD student in Neuroscience (University of Trieste, Italy)
- Gioia De Franceschi (University of Trieste), fall 2012 – fall 2013
  Next position: PhD student, University College London, UK
- Matilde Fiorini (University of Trento), fall 2011 – fall 2012
  Next position: PhD student, University of Tubingen, Germany
- Dario Campagner (University of Trieste), fall 2011 – fall 2012
  Next position: PhD student, University of Manchester, UK
- Alessandro Di Filippo (University of Trieste), fall 2009 – fall 2010
  Next position: PhD student, SISSA, Trieste, Italy
- Marino Pagan (Scuola Superiore Sant'Anna di Pisa – MIT), fall 2007 – summer 2009
  Next position: PhD student, University of Pennsylvania, USA
- Basma Radwan (Boston University), fall 2007 – fall 2008.
  Next position: PhD student, New York University, USA

Postdoctoral researchers and technical assistants supervised (primary advisor role)

- Felicia Sangermano, 2022 – present (technical assistant)
- Tayebe Talebi, 2020 – 2022 (software/hardware developer)
- Walter Vanzella, 2020 – 2021 (software/hardware developer)
  Next position: CEO, Glance Vision Technologies, Trieste (Italy)
- Anna Carboncino, 2018 – 2021 (technical assistant)
  Next position: Technical Assistant Fellow, Albert Einstein College of Medicine, Rose F. Kennedy Center, New York (USA)
- Margherita Riggi, 2014 – 2021 (technical assistant & lab manager)
- Alessio Ansuini, 2014 – 2019 (postdoctoral fellow)
  Next position: Research Scientist in Data Analytics and Artificial Intelligence, Area Science Park, Trieste (Italy)
- Mattia D'Andola, May 2016 – 2018 (postdoctoral fellow)
  Next position: Postdoctoral Fellow, Neuro-Electronics Research Flanders (NERF), Leuven (Belgium)
- Rosilari Bellacosa Marotti, 2015 – 2018 (postdoctoral fellow)
  Next position: Cofounder and R&D director, SynDiag, Treviso (Italy)
- Natalia Grion, 2014 – 2018 (postdoctoral fellow)
  Next position: Data Scientist, ProntoPro, Milan (Italy)
- Daniele Bertolini, 2014 – 2018 (software/hardware developer & lab manager)
  Next position: project manager, VIVISOL (SOL group), Milan (Italy)
- Nelli Redolfi, 2016 – 2017 (technical assistant)
- Walter Vanzella, 2014 – 2017 (software/hardware developer)
  Next position: CEO, Glance Vision Technologies, Trieste (Italy)
- Federica Buffolo, 2014 – 2015 (technical assistant)
  Next position: PhD student, Neuroscience and Brain Technologies department, Italian Institute of Technology, Genova (Italy)
- Houman Saafai, 2011 – 2012 (postdoctoral fellow)
  Next position: Postdoctoral Fellow, Group of S. Panzeri, Italian Institute of Technology, Rovereto (Italy)
- Sahitya Chetan Pandanaboina, Jun 2010 – 2014

Professional Service

Ph.D. students committees

- Pedro Lagomarsino de Leon Roig (University of Genova and Italian IIT, Genova, Italy), PhD 2021
- Els Crijns (Catholic University of Leuven, Belgium), PhD 2019
- Arezoo Alizadeh (University of Genova and Italian IIT, Genova, Italy), PhD 2019
- Christophe Bossen (Catholic University of Leuven, Belgium), PhD 2017
- Saba Gharaei (University of Sidney, Sidney), PhD 2016
- Joanna Jaemolowska (University of Trieste, Italy), PhD 2014
- Ben Vermaercke (University of Leuven, Belgium), PhD 2012
- Ilaria Sani (University of Verona, Italy), PhD 2011

Reviewer/editor for journals and conferences

- Reviewer for: *BioMed Research International, Brain Research, Computational Brain & Behavior, Current Directions in Psychological Science, Developmental Science, eLife, eNeuro, European Journal of Neuroscience, Frontiers in Neural Circuits, Frontiers in Neuroengineering, Frontiers in Perception Science, Genes, Brain and Behavior, Journal of Cognitive Neuroscience, Journal of Computational Neuroscience, Journal of Experimental Biology, Journal of Neurophysiology, Journal of Neuroscience, Journal of Vision, Neuropsychologia, Neuroscience, Nature, Nature Communications, Nature Neuroscience, Nature Protocols, Neuroscience, Physiology & Behavior, Plos Biology, Plos Comp. Biology, Plos One, Psychological Research, Scientific Reports, Vision Research*
- Reviewer for: *Computational and System Neuroscience (COSYNE) 2011 & 2013*
- Host editor for:
  - Frontiers Research Topic *"What can simple brains teach us about how vision works"* (published in 2015)
  - Frontiers Research Topic *"Sensory Adaptation" (*published in 2022*)*
- Editorial member of: *Scientific Reports* (since 2019)

Reviewer/panel member for granting agencies and evaluation panels

- European Research Council (ERC) Synergy Grant 2022, EU (reviewer)
- Medical Research Council (MRC) 2020, UK (reviewer)
- CIMeC postdoctoral fellowships 2019, University of Trento, Italy (reviewer)
- Qualitative evaluation of completed ERC projects 2018, EU (reviewer)
- ATIP-Avenir program 2018, France (panel member)
- European Research Council (ERC) Advanced Grant 2017, EU (reviewer)
- Progetti di Ricerca di Interesse Nazionale (PRIN) 2016, Italy (reviewer)
- Boehringer Ingelheim Fonds PhD fellowships 2016, Germany (reviewer)
- Biotechnology and Biological Sciences Research Council (BBSRC) 2016, UK (reviewer)
- Italian Evaluation of Research Quality (VQR) 2016, Italy (reviewer)
- Volkswagen Foundation 2015, Germany (reviewer)
- Netherlands Organization for Scientific Research (NWO) 2014, Netherlands (reviewer)
- Fund for Scientific Research Flanders (FWO) Postdoctoral Fellowship 2013, Belgium (reviewer)
- Italian Evaluation of Research Quality (VQR) 2013, Italy (reviewer)
- National Science Foundation (NSF) 2012, USA
- Academy of Sciences for the Developing World (TWAS) 2011 (reviewer)
- Fund for Scientific Research Flanders (FWO) Grant 2010, Belgium (reviewer)
- University of Leuven Research Council 2009, Belgium (reviewer*)*

Organization of schools, workshops and conferences

2019: **1st ECLT/SISSA Workshop, June 24, 2019 (Venice, Italy)**
Where computer science meets neuroscience
Organizers: Marcello Pelillo (ECLT), Achille Giacometti (ECLT) & Davide Zoccolan (SISSA)

2019: **Workshop @ COSYNE 2019, March 5 (Cascais, Portugal)**
Studying visual processing in rodents: where a decade of research has taken us and what is waiting ahead
Organizers: Davide Zoccolan (SISSA) & Andrea Benucci (Riken Institute, Japan)

2018: **ICTP Winter School on Quantitative System Biology, Nov 12-23 (Trieste, Italy)**
Learning and Artificial Intelligence
Organizers: Antonio Celani (International Center for theoretical Physics, Trieste, Italy), Davide Zoccolan (SISSA) & Chris Mathys (SISSA)

Teaching

Physiology and functions of the mammalian visual system (graduate course)
Neurobiology and Cognitive Neuroscience Sectors, SISSA
Semesters taught: spring 2010, fall 2011-2022
Approximately 12 hours of lecture

Network neuroscience (graduate course)
Neurobiology Sector, SISSA
Semester taught: fall 2009
Approximately 3 hours of lecture

Master in scientific and digital journalism (SISSA, 2011) – http://mgsd.sissa.it/
Co-coordinator of the "Science Frontiers" module
One lecture taught about "Neuroscience and Artificial Intelligence"

Publications

[# = invited] [* = contributed equally] [§ = corresponding author]

Edited books

1. **Zoccolan D**, Cox DD, Benucci A & Reid C, eds. (2015). *What can simple brains teach us about how vision works.* ***Lausanne: Frontiers Media.*** doi: 10.3389/978-2-88919-678-4

2. Adibi M, **Zoccolan D**, Clifford CWG, eds. (2022). *Sensory Adaptation*. ***Lausanne: Frontiers Media***. doi: 10.3389/978-2-88974-179-3

Reviews, opinions, editorials, book chapters

1. Adibi M#, **Zoccolan D#**, Clifford CWG# (2022). *Editorial: Sensory adaptation*. ***Front. Systems Neurosci.*** 15: 809000.

2. **Zoccolan D#** & Di Filippo (2018). *Methodological approaches to the behavioral investigation of visual perception in rodents*. In ***Handbook of Object Novelty Recognition***, 69-101, Eds. A Ennaceur and MA De Sousa Silva, Academic Press, London.

3. **Zoccolan D#**, Cox DD#, Benucci A# (2015). *Editorial: What can simple brains teach us about how vision works.* ***Front. Neural Circuits*** 9(51).

4. **Zoccolan D#** (2015). *Invariant visual object recognition and shape processing in rats.* ***Behav. Brain. Res.*** 285, 10-33

5. DiCarlo JJ[#], **Zoccolan D** & Rust NC (2012). *How does the brain solve visual object recognition?* ***Neuron*** 73, 415-434

Peer-reviewed research articles in journals and conference proceedings

1. Caramellino R[*], Piasini E[*,] Buccellato A, Carboncino A, Balasubramanian V[§] & **Zoccolan D**[§] (2021). *Rat sensitivity to multipoint statistics is predicted by efficient coding of natural scenes.* ***eLife*** 10:e72081.

2. Matteucci G[*], Zattera B[*,] Bellacosa Marotti R & **Zoccolan D**[§] (2021). *Rats spontaneously perceive global motion direction of drifting plaids.* ***PLoS Comput. Biol.*** 17(9): e1009415

3. Piasini E[*], Soltuzu L[*], Muratore P, Caramellino R, Vinken K, Op de Beeck H, Balasubramanian V & **Zoccolan D**[§] (2021). *Temporal stability of stimulus representation increases along rodent visual cortical hierarchies.* ***Nature Comm.*** 12, 4448

4. Romeni S, **Zoccolan D** & Micera S[§] (2021). *A Machine Learning Framework to Optimize Optic Nerve Electrical Stimulation for Vision Restoration.* ***Patterns*** 2(7), 100286

5. Yamil V, Viviani E, **Zoccolan D** & Crepaldi D[§] (2021). *A general-purpose mechanism of visual feature association in visual word identification and beyond.* ***Curr. Biol.*** 31(6), 1261-1267

6. Matteucci G[*], Riggi M[*] & **Zoccolan D**[§] (2020). *A template-matching algorithm for laminar identification of cortical recording sites from evoked response potentials.* ***J. Neurophys.*** 124, 102–114

7. Matteucci G & **Zoccolan D**[§] (2020). *Unsupervised experience with temporal continuity of the visual environment is causally involved in the development of V1 complex cells.* ***Science Adv.*** 6(22): eaba3742

8. Ansuini A[§], Laio A[§], Macke J[§] & **Zoccolan D**[§] (2019). *Intrinsic dimension of data representations in deep neural networks.* ***Adv. Neural Info. Processing Systems (NeurIPS)*** 32

9. Vanzella W[*], Grion N[*], Bertolini D[*], Perissinotto A, Gigante M & **Zoccolan D**[§] (2019). *A passive, camera-based head-tracking system for real-time, three-dimensional estimation of head position and orientation in rodents.* ***J. Neurophys.*** 122, 2220-2242

10. Matteucci G, Bellacosa Marotti R, Riggi M, Rosselli FB[§] & **Zoccolan D**[§] (2019). *Nonlinear processing of shape information in rat lateral extrastriate cortex.* ***J. Neurosci.*** 39, 1649-1670

11. Vascon S[*], Parin Y[*], Annavini E[*], D'Andola M, **Zoccolan D** & Pelillo M[§] (2019). *Characterization of visual object representations in rat primary visual cortex. In: Leal-Taixé L., Roth S. (eds) Computer Vision – ECCV 2018 Workshops. ECCV 2018.* ***Lect. Notes Comp. Science,*** 11131, 577-586. *Springer, Cham*

12. Djurdjevic V[*], Ansuini A[*], Bertolini D, Macke JH & **Zoccolan D**[§] (2018). *Accuracy of rats in discriminating visual objects is explained by the complexity of their perceptual strategy.* ***Curr. Biol.*** 28(7), 1005-1015.

13. Nikbakht N, Tafreshiha A, **Zoccolan D** & Diamond ME[§] (2018). *Supralinear and supramodal integration of visual and tactile signals in rats: psychophysics and neuronal mechanisms.* ***Neuron*** 97, 626-639

14. Tafazoli S*, Safaai H*, De Franceschi G, Rosselli FB, Vanzella W, Riggi M, Buffolo F, Panzeri S & **Zoccolan D**§ (2017). *Emergence of transformation-tolerant representations of visual objects in rat lateral extrastriate cortex.* ***eLife*** 6:e22794.

15. Usmani S*, Aurand ER*, Medelin M, Fabbro A, Scaini D, Laishram J, Rosselli FB, Ansuini A, **Zoccolan D**, Scarselli M, De Crescenzi M, Bosi S, Prato M & Ballerini L§ (2016). *3D meshes of carbon nanotubes guide functional reconnection of segregated spinal explants.* ***Science Adv.*** 2(7): e1600087

16. Rosselli FB*, Alemi-Neissi A*, Ansuini A & **Zoccolan D**§ (2015). *Object similarity affects the perceptual strategy underlying invariant visual object recognition in rats.* ***Front. Neural Circuits*** 9(10). *doi: 10.3389/fncir.2015.00010*

17. Baldassi C*, Alemi-Neissi A*, Pagan M*, DiCarlo JJ, Zecchina R & **Zoccolan D**§ (2013). *Shape similarity, better than semantic membership, accounts for the structure of visual object representations in a population of monkey inferotemporal neurons.* ***PLoS Comput. Biol.*** 9(8): e1003167

18. Alemi-Neissi A*, Rosselli FB* & **Zoccolan D**§ (2013). *Multifeatural shape processing in rats engaged in invariant visual object recognition.* ***J. Neurosci.*** 33, 5939-5956

19. Tafazoli S*, Di Filippo A* & **Zoccolan D**§ (2012). *Transformation-tolerant object recognition in rats revealed by visual priming.* ***J. Neurosci.*** 32, 21-34

20. **Zoccolan D**, Graham JB & Cox DD§ (2010). *A self-calibrating, camera-based eye tracker for the recording of rodent eye movement.* ***Front. Neurosci.*** 4:193

21. Li N, Cox DD, **Zoccolan D** & DiCarlo JJ§ (2009). *What response properties do individual neurons need to underlie object recognition in clutter?* ***J. Neurophysiol.*** 102, 360-376.

22. **Zoccolan D***, Oertelt N*, DiCarlo JJ & Cox DD§ (2009). *A rodent model for the study of invariant visual object recognition.* ***Proc. Natl. Acad. Sci. USA*** 106, 8748-53.

23. **Zoccolan D**, Kouh M, Poggio T & DiCarlo JJ§ (2007). *Trade-off between object selectivity and tolerance in monkey inferotemporal cortex.* ***J. Neurosci.*** 27, 12292-12307.

24. **Zoccolan D***, Cox DD* & DiCarlo JJ§ (2005). *Multiple object response normalization in monkey inferotemporal cortex.* ***J. Neurosci.*** 25, 8150-64.

25. Garcia-Perez E*, Mazzoni A*, **Zoccolan D***, Robinson HP & Torre V§ (2005). *Statistics of decision making in the leech.* ***J. Neurosci.*** 25, 2597-608.

26. Mazzoni A, Garcia-Perez E, **Zoccolan D**, Graziosi S & Torre V§ (2005). *Quantitative characterization and classification of leech behavior.* ***J. Neurophysiol.*** 93:580-93.

27. Rosato-Siri MD*, **Zoccolan D***, Furlan F & Ballerini L§ (2004). *Interneurone bursts are spontaneously associated with muscle contractions only during early phases of mouse spinal network development: a study in organotypic cultures.* ***Eur. J. Neurosci.*** 20:2697-710.

28. Garcia-Perez E*, **Zoccolan D***, Pinato G & Torre V§ (2004). *Dynamics and reproducibility of a moderately complex sensory-motor response in the medicinal leech.* ***J. Neurophysiol.*** 92:1783-95.

29. **Zoccolan D**, Pinato G & Torre V§ (2002*). Highly variable spike trains underlie reproducible sensory-motor responses in the leech.* ***J. Neurosci.*** 22, 10790-800.

30. **Zoccolan D** & Torre V§ (2002). *Using optical flow to characterize sensory-motor interactions in a segment of the medicinal leech.* ***J. Neurosci.*** 22, 2283-98.

31. **Zoccolan D**, Giachetti A, & Torre V§ (2001). *The use of optical flow to characterize muscle contraction.* ***J. Neurosci. Methods*** 110, 65-80.

32. Arisi I, **Zoccolan D**, & Torre V§ (2001). *Distributed motor pattern underlying whole-body shortening in the medicinal leech.* ***J. Neurophysiol.*** 86, 2475-88.

Other conference Proceedings

- **Zoccolan D** (2001). *Computer vision methods for quantifying muscle contractions.* ***World Congress on Neuroinformatics***, Vienna, Austria.

- Agostini V, Delsanto PP & **Zoccolan D** (2000). *Flaw Detection in Composite Plates by means of Lamb Waves.* ***15th World Conference on Non-Destructive Testing***, Roma, Italy.

- Delsanto PP, Perego G, Scalerandi M & **Zoccolan D** (1999). *Efficiency of different ultrasonic surface waves for subsurface flaws detection.* ***Review of Progress in Quantitative Nondestructive Evaluation***, *Vol.* 18, 127-133, edited by Thompson and Chimenti, Kluwer Academic/Plenum Publishers.

Conference Abstracts

- Zanzi M & **Zoccolan D** (2022). *Impact of task-irrelevant auditory information on a visual rate categorization task.* ***Vision Sciences Society (VSS) Meeting 2022***, St. Pete Beach, Florida (USA).

- Caramellino R, Piasini E, Zelenkova V, Ricci D, Balasubramanian V & **Zoccolan D** (2022). *Neuronal bases of efficient coding of natural scenes in rat visual cortex.* ***Vision Sciences Society (VSS) Meeting 2022***, St. Pete Beach, Florida (USA).

- Muratore P, Tafazoli S, Laio A & **Zoccolan D** (2022). *Similar reformatting of object manifolds across rat visual cortex and deep neural networks.* ***Computational and Systems Neuroscience (COSYNE) 2022***, Lisbon, Portugal.

- Caramellino R, Piasini E, Buccellato A, Carboncino A, Balasubramanian V & **Zoccolan D** (2021). *Rat sensitivity to multipoint statistics is predicted by efficient coding of natural scenes.* ***Computational and Systems Neuroscience (COSYNE) 2021*** (online conference).

- Annavini E, D'Andola M, Ansuini A & **Zoccolan D** (2020). *Time continuity of early visual experience drives the development of ventral stream representations.* ***Computational and Systems Neuroscience (COSYNE) 2020***, Denver, CO (US).

- Matteucci G & **Zoccolan D** (2019). *The causal role of unsupervised temporal learning in the development of V1 complex cells.* ***Computational and Systems Neuroscience (COSYNE) 2019***, Lisbon, Portugal.

- Grion N, Montano I, Matteucci G & **Zoccolan D** (2018). *Dark-reared rats develop higher visual acuity than controls in an orientation discrimination task.* ***European Conference of Visual Perception (ECVP) 2018***, Trieste, Italy.

- Matteucci G, Bellacosa Marotti R, Zattera B & **Zoccolan D** (2018). *Linear receptive field structure does not account for pattern motion responses in rat visual cortex.* ***European***

Conference of Visual Perception (ECVP) 2018, Trieste, Italy.

- Annavini E, D'Andola M & **Zoccolan D** (2018). *Emergence of a hierarchical structure in the neural representation of visual objects in the rat.* ***European Conference of Visual Perception (ECVP) 2018,*** Trieste, Italy.

- Di Filippo A, Ansuini A, Godenzini L, Diamond ME & **Zoccolan D** (2018). *Trade-off between multisensory integration and cross-modal interference in rats engaged in visuotactile pattern discrimination*. ***Computational and Systems Neuroscience (COSYNE) 2018***, Salt Lake City, Utah, USA

- Nikbakht N, Adibi M, **Zoccolan D** & Diamond ME (2017). Multisensory decision making in rats and underlying neuronal mechanisms. ***Society for Neruoscience (SFN) Annual Meeting***, Washington, DC, USA.

- Soltuzu L & **Zoccolan D** (2017) A systematic study of variation of response sparseness across rat visual cortical areas. ***Computational and Systems Neuroscience (COSYNE) 2017***, Salt Lake City, Utah, USA

- Rosselli FB, Matteucci G, Bellacosa Marotti R & **Zoccolan D** (2016) Receptive field structure of visually selective neurons in rat visual cortex. ***Bernstein Conference 2016***, Berlin, Germany.

- Di Filippo A, Godenzini L, Diamond M & **Zoccolan D** (2016). Initial training with a specific sensing modality determines rat ability to integrate unisensory perceptual strategies in a multisensory pattern discrimination task. ***Society for Neruoscience (SFN) Annual Meeting***, San Diego, USA.

- Nikbakht N, **Zoccolan D** & Diamond ME. (2016). Visual tactile integration in rats and underlying neuronal mechanisms. ***Society for Neruoscience (SFN) Annual Meeting***, San Diego, USA.

- Bellacosa Marotti R, Rossi SE & **Zoccolan D** (2016). Rats can process high-level motion: a behavioral study usign a discrimination task. ***Society for Neruoscience (SFN) Annual Meeting***, San Diego, USA.

- Nikbakht N, Tafreshiha A, Quiroga RQ, **Zoccolan D** & Diamond ME. (2015). Integration of visual and tactile signals in behaving rats. ***Society for Neruoscience (SFN) Annual Meeting***, Chicago, USA.

- Nikbakht N, Tafreshiha A, Quiroga RQ, **Zoccolan D** & Diamond ME. (2014). Integration of visual and tactile signals in behaving rats. ***Computational and Systems Neuroscience (COSYNE) 2014***, Salt Lake City, Utah, USA.

- Di Filippo A, Diamond M & **Zoccolan D** (2014). Perceptual Strategy Underlying Visio-Tactile Object Categorization in Rats. ***9th FENS Forum of Neuroscience,*** Milano (Italy).

- Di Filippo A, Diamond M & **Zoccolan D** (2014). Perceptual Strategy Underlying Visio-Tactile Object Categorization in Rats. ***4th Workshop on Cognition and Evolution,*** Rovereto, Trento (Italy).

- Rosselli FB, Rossi S & **Zoccolan D** (2013). Task switching in rats: a behavioral paradigm to investigate attentional modulation of sensory representation in rodents. ***Rovereto Attention Workshop (RAW) 2013***, Rovereto, Trento (Italy).

- Di Filippo A, Diamond M & **Zoccolan D** (2013). Visuo-Tactile Object Categorization in Rats. ***Congresso Annuale della Sezione di Psicologia Sperimentale dell'AIP,*** Roma (Italy).

- Tafazoli S, Safaai H, Fiorini M, De Franceschi G & **Zoccolan D** (2013). Object selectivity and tolerance to variation in object appearance trade off across rat visual cortical areas V1 and TeA. ***Computational and Systems Neuroscience (COSYNE) 2013***, Salt Lake City, Utah, USA.

- Pandanaboina SC & **Zoccolan D** (2012). A functional neuroanatomy study of the role of rat visual and association cortex in processing visual and tactile object information. ***Society for Neuroscience, Annual Meeting,*** New Orleans, LA, USA.

- Alireza Alemi-Neissi, Carlo Baldassi, Alfredo Braunstein, Andrea Pagnani, Riccardo Zecchina & **Davide Zoccolan** (2012). Information theoretic and machine learning approaches to quantify non-linear visual feature interaction underlying visual object recognition. ***Twenty First Annual Computational Neuroscience Meeting: CNS 2012***, Decatur, GA, USA.

- Alemi-Neissi A, Rosselli F & **Zoccolan D** (2011). Rats' invariant object recognition relies on tracking salient visual features across object views. ***Computational and Systems Neuroscience (COSYNE) 2011***, Salt Lake City, Utah, USA.

- Tafazoli S, Di Filippo A & **Zoccolan D** (2011). Invariant perception of visual objects in rats revealed by visual priming. ***Computational and Systems Neuroscience (COSYNE) 2011***, Salt Lake City, Utah, USA.

- Pagan M, Alemi-Neissi A, Baldassi C, Zecchina R, DiCarlo JJ & **Zoccolan D** (2011). From luminance to semantics: how natural objects are represented in monkey inferotemporal cortex. ***Computational and Systems Neuroscience (COSYNE) 2011***, Salt Lake City, Utah, USA.

- **Zoccolan D**, Cox DD, Oertelt N, Radwan B, Tsang S & DiCarlo JJ (2008). Can rodents be valuable model systems for studying invariant visual object recognition? ***Computational and System Neuroscience (COSYNE) 2008***, Salt Lake City, Utah, USA.

- **Zoccolan D**, Kouh M, Poggio T & DiCarlo JJ (2006). Object recognition in clutter: selectivity and invariance properties in monkey inferior temporal cortex. ***Gordon Research Conference: Sensory coding and the natural environment***, Big Sky, MT, USA.

- Li N, Cox DD, **Zoccolan D** & DiCarlo JJ (2006). Flexible and robust object recognition in inferior temporal cortex supported by neurons with limited position and clutter tolerance. ***Society for Neuroscience, 36th Annual Meeting,*** Atlanta, GA, USA.

- **Zoccolan D**, Cox DD & DiCarlo JJ (2005). Multiple object response normalization in monkey inferotemporal cortex. ***Society for Neuroscience, 35th Annual Meeting,*** Washington, DC, USA.

- Garcia-Perez E, **Zoccolan D**, Mazzoni A, Robinson HP & Torre V (2003). A quantitative analysis of the behavior of the "almost free" leech. ***Society for Neuroscience, 33rd Annual Meeting,*** New Orleans, LA, USA.

- **Zoccolan D** and Torre V (2002). Using optical flow to characterize sensory-motor responses in a leech segment and to evaluate their reproducibility. ***3rd Forum of European Neuroscience***, Paris, France.

- **Zoccolan D**, Pinato G & Torre V (2001). Highly variable spike trains underlie reproducible motor outputs in the leech Hirudo medicinalis. ***Society for Neuroscience, 31st Annual Meeting,*** San Diego, CA, USA.

- **Zoccolan D** and Torre V (2000). The use of videomicroscopy and computer vision to monitor muscle contraction in the leech skin. ***Society for Neuroscience, 30th Annual Meeting***, New Orleans, LA, USA.

Invited Talks

- Department of Physiology, Monash University, Melbourne, Australia (2021) *[Zoom seminar]*
- School of Biological and Chemical Sciences, Queen Mary University of London, London, UK (2019)
- Department of Brain and Cognition, KU Leuven, Leuven, Belgium (2019)
- Workshop on Data Science, International Center for Theoretical Physics (ICTP), Trieste, Italy (2019)
- Trieste NEXT 2019, Trieste, Italy (2019)
- 1st ECLT/SISSA Workshop: where computer science meets neuroscience, Ca' Foscari University of Venice, Italy (2019)
- Department of Cognitive Science, Central European University, Budapest, Hungary (2019)
- IMT School for Advanced Studies, Lucca, Italy (2019)
- Centro Nazionale delle Ricerche (CNR), Pisa, Italy (2019)
- Italian Institute of Technology (IIT), Genova, Italy, "Neural Circuits Seminar series" (2018)
- SIFB-ALPE ADRIA Meeting on Photobiology, Udine, Italy (2018) [keynote speaker]
- Workshop on "Mutual Benefits of Cognitive and Computer Vision" at the International Conference on Computer Vision (ICCV), Venice, Italy (2017) [keynote speaker]
- Workshop on "Experimental and Theoretical Analysis of Cortical Dynamics", Italian Institute of Technology (IIT), Rovereto, Italy (2017)
- Joint Weizmann-SISSA Meeting "Emergent structures in Physics and Neuroscience", Weizmann Institute of Science, Rehovot, Israel (2017)
- European Centre for Living Technology (ECLT), Ca' Foscari University of Venice, Italy (2017)
- Department of Mathematics and Department of Pharmacy and Biotechnology, University of Bologna, Italy (2017)
- Collegio universitario per le scienze Luciano Fonda, University of Trieste, Italy (2017)
- Testimonial, as a successful ERC grant recipient, at the "National day of presentation of ERC Work Program 2017", Istituto Superiore di Sanita', Rome, Italy (2016)
- European Brain Research Institute (EBRI), Rome, Italy (2016)
- Institute of Neuroscience & Psychology, College of Medical, Veterinary and Life Sciences, University of Glasgow, UK (2016)
- 113th International Titisee Conference "Building tools for quantifying brain and behavior", Schwarzwaldhotel Titisee, Germany (2016)
- School on Neurotechniques 2016, Padova, Italy (2016)
- European Brain and Behaviour Society & European Behavioural Pharmacology Society Joint Meeting, Pre-meeting symposium: "The future of cognitive testing in rodents", Verona, Italy (2015)
- Center of Advanced European Studies and Research (CAESAR), Bonn, Germany (2015)
- ABC Network Meeting, Italian Institute of Technology (IIT), Center for Neuroscience and Cognitive Systems, Rovereto, Italy (2015)

- International Center for Theoretical Physics (ICTP), Quantitative Life Science Seminars, Trieste, Italy (2015)
- Italian Institute of Technology (IIT), Center for Neuroscience and Cognitive Systems, Rovereto, Italy (2014)
- University of Fribourg, Department of Medicine, Fribourg, Switzerland (2014)
- Sensory Coding & Natural Environment (SCNE), Gottingen, Germany (2014)
- Osnabruck Computational Cognition Alliance Meeting (OCCAM), Osnabruck, Germany (2014)
- The 2nd ISFN Annual Meeting & the 2nd Binational Italian-Israeli Neuroscience Meeting, Eilat, Israel (2013)
- Max Plank Institute for Biological Cybernetics, Tubingen, Germany (2013)
- University College of London, Division of Psychology and Language Sciences, London, UK (2012)
- Università "La Sapienza" di Roma, Dipartimento di Fisiologia e Farmacologia, Roma, Italy (2012)
- Il Circolo dei Lettori, Torino, Italy (2010)
- International School for Advanced Studies, Neurobiology Sector, Trieste, Italy (2007)
- Politecnico di Torino, Torino, Italy (2007)
- Institute for Scientific Interchange Foundation, Torino, Italy (2007)
- Università di Torino, Scuola di Dottorato di Neuroscienze, Torino, Italy (2007)
- Université de Toulouse, CerCo, Toulouse, France (2007)
- McGovern Institute 4th Annual Retreat, M.I.T., Newport, RI, USA (2006)
- Conte Center Annual Meeting, Detection and Recognition of Objects in Visual Cortex, Cambridge, MA, USA (2006)
- Society for Neuroscience, 35th Annual Meeting, Washington, DC, USA (2005)
- Conte Center Annual Meeting, Detection and Recognition of Objects in Visual Cortex, Cambridge, MA, USA (2005)
- McGovern Institute 2nd Annual Retreat, M.I.T., Falmouth, MA, USA (2004)
- Conte Center Annual Meeting, Detection and Recognition of Objects in Visual Cortex, Cambridge, MA, USA (2004)
- Conte Center Annual Meeting, Detection and Recognition of Objects in Visual Cortex, Cambridge, MA, USA (2003)
- Newcastle University, School of Psychology, Newcastle upon Tyne, UK (2002)
- University College of London, Gatsby Computational Neuroscience Unit, London, UK (2002)