GiacomoBenvenuti

contacts

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personal info

Italian
37 years old

techniques

VSD imaging
Calcium imaging
Single electrode
Utah Array
Optogenetic stim.
Electric stim.
Imaging+electrode
Viral Transfection
Eyelink
Plexon spk sorting

languages

Italian mother tongue
English fluency
French fluency

programming

Matlab
Python
Psychtoolbox
Chronux
Elphy
Rex
Tempo
LaTeX
Html, css, JavaScript

productivity tools

Git
Mendeley
Illustrator
Trello
Dropbox paper
Atom

experience

2015–Now **Postdoc in Neuroscience** — University of Texas, Austin, TX, USA
PI: Eyal Seidemann
Linking neural population representations in monkey primary visual cortex to perception.

- Published a peer reviewed article in an international high impact journal (as first author)
- Designed electrophysiological, psychophysical and computational experiments & analysis.
- Developed computational methods to decode and model neural population responses and analyze monkeys and humans behavior.
- Run Wide-field voltage-sensitive-dyes and calcium imaging in behaving monkeys.
- Performed viral transfections of monkeys cortex with genetic tools.
- Trained monkeys to perform demanding behavioral tasks.
- Programmed and run psycho-physics experiments in humans.
- Performed opto-genetic and electrical stimulation in the cortex of the behaving monkey.
- Developed a new technique to perform close-loop brain stimulation in the behaving monkey.
- Performed surgical procedures to implant and maintain chronic cranial windows in monkeys to perform imaging of the cortex.
- Supervised four graduate and undergraduate students

Teaching — University of Texas, Austin, TX, USA
Guest lecture on Vision for the graduate course "Principles of Neuroscience II"

2009–2015 **Graduate Research Assistant in Neuroscience** — CNRS, Marseille, France
PI: Frederic Chavane
Lateral computation in the primary visual cortex

- Published a peer review article in an international high impact journal
- Programmed and run electrophisiological experiments in the awake monkey using single- and multi-electrodes (Utah array)
- Developed computational methods to decode neural population responses
- Programmed advanced spectral analyses of local field potential (LFP)
- Performed surgical procedures to implant and maintain chronic cranial windows in monkeys to perform electrophisiology
- Trained monkeys to perform behavioral tasks.

2007–2009 **Undergraduate Research Assistant in Neuroscience** — University of Turin, Italy
PI: B. Sacchetti & P. Strata
Study the role of secondaries sensory cortexes in emotional memories storage

- Run eletrctrophysiological recordings using whole-cell patch clamp in slices of mice hippo-campus
- Recorded and analyzed mice behavior
- Performed histological analysis in the mouse brain

2005 – 2006 **Undergraduate Research Assistant in Neuropharmacology** — University of Florence, Italy
PI: A. Chiarugi & F. Moroni

- Run experiments in-vitro on single neurons with a wide range of pharmacological and molecular techniques

2004 – 2004 **Undergraduate Research Assistant in Genomics** — University of Florence, Italy
Apprenticeship as laboratory technician in genomic analysis

education

2009–2015 **PhD** in Neuroscience — CNRS, Marseille, France
top marks and honors
thesis "Anticipation of a moving bar by neuronal populations in awake monkey V1"

2006–2009 **Master** of Neurobiology — University of Turin, Italy
top marks and honors
thesis "The role of secondaries sensory cortexes in emotional memories storage"

2002–2006 **Bachelor** of Biotechnology — University of Florence, Italy
top marks and honors
thesis "Biomolecular mechanisms induced by Poly(ADP-ribose) polymerase-1 (PARP-1) hyperactivation" (Neuropharmacology)

training

2011 **European summer School** — Univ. of Magdeburg, Germany
Visual Neuroscience - from Spikes to Awarness

2010 – 2013 **FACETS-ITN PhD training courses:**

- Intellectual property course by european patent academy, 2011, UPF, Barcelona, Spain
- Ethics course, 2011, EPFL, Lausanne, Switzerland
- Theoretical Neuroscience course, 2011, EPFL, Lausanne, Switzerland
- Scientific grant writing, 2012, Heidelberg, Germany
- Neuromorphic hardware course, 2012, Heidelberg, Germany
- Software course: From Biomodel simulators to hardware, 2012, Heidelberg
- Theoretical approaches to new computation concepts, 2012, Leysin, Switzerland
- Experiments with large scale hardware systems, 2012, Forschungszentrum Julich, Germany
- Bioelectronic interface, March 2012, IMS Bordeaux, France
- Scientific writing, March 2012, IMS Bordeaux, France

awards

2009-2012 **PhD fellowship from Marie Curie Initial Training Network "FACETS-ITN".**
European project aimed to transfer concepts from brain dynamic to brain-inspired machines (https://facets.kip.uni-heidelberg.de/ITN/).

publications

2020 **An Open Resource for Non-Human Primate Optogenetics**
S. Tremblay, ..., G. Benvenuti, ..., M.L. Platt
Neuron 108 (6) 1075-1090. e6

2018 **Scale-Invariant Visual Capabilities Explained by Topographic Representations of Luminance and Texture in Primate V1**
G Benvenuti, Y Chen, C Ramakrishnan, K Deisseroth, WS Geisler, E Seidemann
Neuron 100 (6), 1504-1512. e4

2017 **Spontaneous cortical activity is transiently poised close to criticality**
G Hahn, A Ponce-Alvarez, C Monier, G Benvenuti, A Kumar, F Chavane, G Deco, Y Frégnac
PLoS computational biology 13 (5), e1005543

2015 **Testing the odds of inherent vs. observed overdispersion in neural spike counts**
W Taouali, G Benvenuti, P Wallisch, F Chavane, LU Perrinet
Journal of neurophysiology 115 (1), 434-444

2015 **Anticipation of an approaching bar by neuronal populations in awake monkey V1**
G Benvenuti, S Chemla, A Boonman, G Masson, F Chavane Journal of vision 15 (12), 479-479

2015 **A dynamic model for decoding direction and orientation in macaque primary visual cortex.**
W Taouali, G Benvenuti, F Chavane, L Perrinet Journal of vision 15 (12), 484-484

2014 **Measurement of propagating waves from local field potentials and unit activity in the cortex of human and monkey**
LE Muller, G Benvenuti, F Chavane, A Destexhe
BMC neuroscience 15 (1), P174

2013 **Motion based prediction and development of response to an" on the way" stimulus**
MA Khoei, G Benvenuti, F Chavane, LU Perrinet
BMC neuroscience 14 (S1), P314

Under revision

Anticipatory responses along motion trajectories in awake monkey area V1
G. Benvenuti, S. Chemla, A. Boonman, L. Perrinet, G.S. Masson, F. Chavane
Elife

In preparation

Two complementary population coding schemes in primate V1 contribute to scale-invariant pattern discrimination.
G. Benvenuti, Y. Chen, W.S. Geisler, E. Seidemann

A bi-directional optical-genetic toolkit for reading and writing topographic neural population codes in behaving macaque cortex.
G. Benvenuti, Y. Chen, D. Miller, C.T. Sullender, F Radaei, A.K. Dunn, C. Ramakrishnan, K Deisseroth, W.S. Geisler, E. Seidemann

Bi-directional optical-genetic interrogation of primate V1 reveals neural and perceptual masking effects of low-power optogenetic stimulation.
S.C. Chen, G. Benvenuti, Y. Chen, W.S. Geisler, E. Seidemann
(Submitted)

presentations

2018 **Poster** Society for Neuroscience Annual Meeting
Two complementary population coding schemes in primate V1 contribute to scale-invariant pattern discrimination.
Benvenuti G, Chen Y, Geisler WS and Seidemann E.

2017 **Poster** Society for Neuroscience Annual Meeting
Possible Contribution of Retinotopic-scale Luminance Signals in Primate V1 to Visual Pattern Discrimination.
G. Benvenuti, Y. Chen, W.S. Geisler and E. Seidemann

2014 **Presentation** CNS Annual Meeting
Measurement of propagating waves from local field potentials and unit activity in the cortex of human and monkey
L. Muller, G. Benvenuti, F. Chavane, A. Destexhe

2014 **Poster** Society for Neuroscience Annual Meeting
A model relating temporal processing across spatial and temporal scales using electrophysiological and optical imaging data in primate V1
J.L. R. Stevens, S. Chemla, G. Benvenuti, F. Chavane, J. A. Bednar

2013 **Poster** Society for Neuroscience Annual Meeting
Motion integration along a trajectory by neuronal population in alert monkey V1
G. Benvenuti, GS. Masson, F. Chavane

2013 **Poster** CNS Annual Meeting
Motion-based prediction and development of response to an "on the way stimulus"
M. A. Khoei, G. Benvenuti, F. Chavane, L. Perrinet,

2012 **Presentation** BrainScales Workshop - Julich Forshungszentrum
Building a directional anticipatory response along the motion trajectory in monkey area V1
G. Benvenuti, A. Boonman, GS. Masson, F. Chavane

2012 **Poster** GDR multi-électrodes Meeting
Building a directional anticipatory response along the motion trajectory in monkey area V1
G. Benvenuti, A. Boonman, GS. Masson, F. Chavane

2011 **Poster** Society for Neuroscience Annual Meeting
Building a directional anticipatory response along the motion trajectory in monkey area V1
G. Benvenuti, A. Boonman, GS. Masson, F. Chavane

2011 **Presentation** FACET-ITN Workshop - KTH Stockholm - Sweden
How neural population activity can affect single neuron's computation:insights from motion trajectory integration in the primary visual cortex (V1)
G. Benvenuti, A. Boonman, GS. Masson, F. Chavane

references

- **Eyal Seidemann**, Full Professor of Psychology and Neuroscience, Institute for Neuroscience and Center for Perceptual Systems, The University of Texas at Austin. USA.
  Email: eyal@austin.utexas.edu
  Phone: +1 5122326052,
- **Wilson S. Geisler**, Director of Center for Perceptual Systems, The University of Texas at Austin. USA.
  E-mail: w.geisler@utexas.edu
  Phone: +1 512471-5380
- **Frederic Chavane**, Research Director at CNRS, Institut de Neurosciences de la Timone, Aix-Marseille University, France.
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