Valeria Fascianelli

Center for Theoretical Neuroscience, Columbia University, New York, USA ✉ *vf2266@columbia.edu*

Research activities and responsibilities

2020–ongoing **Postdoctoral Research Scientist , Computational Neuroscience (Fusi lab)**, *Center for Theoretical Neuroscience, Columbia University*, New York, USA.

2019 **Ph.D. visitor at Columbia University**, *Center for Theoretical Neuroscience, Columbia University*, New York, USA.
Neural decoding, geometry of neural representations, training of artificial neural networks to perform cognitive tasks.

Education and training

2016-2020 **Ph.D. in Neuroscience (Genovesio lab)**, *La Sapienza University*, Rome, Italy.
Thesis title: *The geometry of abstraction in macaque dorsolateral and orbital prefrontal cortex in a visually cued strategy task"*
Grade: with honors

2015 **Master student visitor at CERN**, *CERN*, Geneva, Switzerland.
Based constantly at CERN as expert of, and part of, the teams of people responsible for, the development and operation of the Level 1 and Level 2 trigger software of NA62 experiment.

2014-2016 **Master of Research in Particle Physics**, *University of Birmingham*, Birmingham, UK.
Thesis title: *Development of a software trigger algorithm for electron identification using the NA62 RICH Cherenkov detector*
Grade: with honors

2013-2014 **Undergraduate fellow at the Italian National Laboratories of Nuclear Physics**, *INFN*, Rome, Italy.
Monte Carlo simulation to study the feasibility of an exclusive search for two-body decays of Heavy Neutrinos at the NA62 experiment.

2012-2014 **M.Sc. in Nuclear and Subnuclear Physics**, *University Tor Vergata*, Rome, Italy.
Thesis title: *Search for Heavy Neutrinos at the NA62 experiment at CERN*
Grade: 110/110 with honors

2008-2011 **B.Sc. degree in Physics**, *University Tor Vergata*, Rome, Italy.
Thesis title: *Measure of the muon lifetime*
Grade: 110/110 with honors

2008 **High School Graduation at Classical Lyceum**, *Liceo Classico Ugo Foscolo, Albano Laziale*, Rome, Italy.
Grade: 100/100

Teaching activities and mentorship

2025 **Invited as Teacher to Mathematical Methods in Computational Neuroscience Summer School**, *Kavli Institute for Systems Neuroscience*, Eresfjord, Norway.

2024 **Lecturer for the Advanced Neurotheory Course**, *Center for Theoretical Neuroscience, Columbia University*, New York, USA.
Lecture's title: The Geometries of Neural Representations

2023 **Teaching assistant of Cognitive Science**, *Barnard College*, New York, USA.

2023 **Teaching assistant at the Methods in Computational Neuroscience summer school**, *Marine Biological Laboratory*, Woods Hole, MA, USA.

2022 **Teaching assistant of Cognitive Science**, *Barnard College*, New York, USA.

2022 **Mentor for the Summer program within the Leadership Alliance Program**, *Center for Theoretical Neuroscience, Columbia University*, New York, USA.

2022 **Lecturer for the Advanced Neurotheory Course**, *Center for Theoretical Neuroscience, Columbia University*, New York, USA.
Lecture's title: The geometries of Abstraction

2014-2015 **Teaching Assistant of Calculus**, *School of Physics and Astronomy, University of Birmingham*, Birmingham, UK.

Working Experiences

2025 **Invited as Research Visitor**, *Kavli Institute for Systems Neuroscience*, Trondheim, Norway.

2025 **Invited as Co-chair of Biocomputation Session**, *Mathematics of Neuroscience and AI Conference*, Split, Croatia.

2024-ongoing **Reviewer for COSYNE**.

2024-ongoing **Reviewer for Journal of Neuroscience**.

2023-ongoing **Reviewer for PNAS journal**.

2021-ongoing **Reviewer for PeerJ journal**.

2022 **Organizer of the workshop at COSYNE2022**.
Workshop title: "Is geometry all you need?"

2021-2022 **Organizer of the weekly Seminar at the Center for Theoretical Neuroscience,**.
Columbia University, New York (USA)

Conferences

Neuroscience Conferences:

2025 **Bernstein Conference**, Main, Germany.
Invited Speaker to the workshop "Relational Inference and knowledge composition via neuronal geometric representations"

2025 **Neuro-inspired AI**, La Sapienza, Rome, Italy.
Invited Speaker to the workshop "Neuro-inspired AI"

2025 **Mathematics for Neuroscience and AI**, Split, Croatia.
Invited Co-Chair of the session "Neural Data"

2025 **COSYNE**, Montreal, Canada.
Invited Speaker to the workshop: "Brain mechanisms of working memory: where do we stand?"

2024 **AREADNE**, Milos, Greece.
Poster title: "Neural signatures of stress susceptibility and resilience in amygdala-hippocampal network"

2024 **COSYNE2024**, Lisbon, Portugal.
Poster title: "Neural signatures of stress susceptibility and resilience in amygdala-hippocampal network"

2023 **COSYNE2023** , Montreal, Canada.
Poster title: "Decoding stress susceptibility from activity in amygdala-ventral hippocampal network"

2022 **SFN 2022**, San Diego, USA.
Poster title: "Neural representational geometry correlates with behavioral differences between monkeys"

2022 **Neuronex meeting**, San Diego, USA.
Poster title: "Neural representational geometry correlates with behavioral differences between monkeys"

2022 **Swartz meeting**, Cold Spring Harbor Laboratory,Long Island, USA.
Talk title: "Neural representational geometry correlates with behavioral differences between monkeys"

2022 **Tri-Center Gatsby meeting**, Hebrew University, Jerusalem, Israel.
Talk title: "Neural representational geometry correlates with behavioral differences between monkeys"

2021 **SFN 2021**, online.
Poster title: "Stimulus and response encoding in a population of Purkinje cells in Crus I and Crus II of the cerebellum during learning of a visuomotor association task"

2021 **SFN 2021**, online.
Poster title: "Neural representational geometry correlates with behavioral differences between monkeys"

2018 **Italian National Congress in Neuroscience**, Ischia, Italy.
Poster title: "Autocorrelation structure in the macaque dorsolateral, but not orbital or polar, prefrontal cortex predicts response-coding strength in a visually cued strategy task"

2017 **Italian national Meeting of PhD students in Neuroscience**, Naples, Italy.
Poster title: "Neural intrinsic timescales in the macaque dorsal premotor cortex predict the strength of spatial response coding"

Physics Conferences:

2015 **Collaboration meeting of the NA62 experiment at CERN**, Prague, Czech Republic.
Talk title:"RICH L1 trigger for dilepton decays: new studies and improvement"

2015 **Collaboration meeting of the NA62 experiment at CERN**, CERN, Geneva.
Talk title:"RICH L1 trigger for dilepton decays"

2014 **Collaboration meeting of the NA62 experiment at CERN**, CERN, Geneva.
Talk title:"Cross talk studies for the KTAG detector"

2014 **Collaboration meeting of the NA62 experiment at CERN**, CERN, Geneva.
Talk title:"Search for Heavy Neutrinos at the NA62 experiment at CERN"

Awards and Fellowships

2025 **Research Fellowship at the Italian Academy in New York**, *New York,USA*.

2018 **"Avvio alla Ricerca" grant of Sapienza University of Rome**, *Sapienza University of Rome*, Rome,Italy.
Project title:"Neural correlates of rule switching in orbital prefrontal cortex"

2018 **Best Project Award at BCBT Summer School**, *Institute for Bioengineering of Catalonia (IBEC)* , Barcelona,Spain.
Project title: "Evaluation of metacognitive abilities in an uncertain collaborative task"

2017 **Best Poster Award at Italian National Congress in Neuroscience**, *Italian Society for Neuroscience* , Ischia,Italy.
Poster title: "Autocorrelation structure in the macaque dorsolateral, but not orbital or polar, prefrontal cortex predicts response-coding strength in a visually cued strategy task"

2017 **Best Poster Award at National Meeting of PhD students in Neuroscience**, *Italian Society for Neuroscience* , Naples,Italy.
Poster title: "Neural intrinsic timescales in the macaque dorsal premotor cortex predict the strength of spatial response coding"

2013-2014 **Undergraduate research fellow at the National Laboratories of Nuclear Physics**, *INFN*, Rome,Italy.

2012-2013 **First classified for the grant "Best students" as undergraduate student**, *University Tor Vergata*, Rome,Italy.

List of Publications

Neuroscience publications

2025 **F.Xia*, V.Fascianelli*, N.Vishwakarma, F.G.Ghinger, A.O. Kwon, M.M. Gergues, L.K. Lalani, S.Fusi, M.A. Kheirbek**, *Understanding the neural code of stress to control anhedonia.*, Nature.
**Equal contribution*

2024 **V.Fascianelli, A.Battista, F.Stefanini, S.Tsujimoto, A.Genovesio, S.Fusi**, *Neural representational geometries reflect behavioral differences in monkeys and recurrent neural networks*, Nature Communications.

2024 **A.E. Ipata*, V.Fascianelli*, C.I. De Zeeuw, N.Sendhilnathan, S. Fusi, M.E. Goldberg**, *Purkinje cells in Crus I and II encode the visual stimulus and the impending choice as monkeys learn a reinforcement based visuomotor association task*, bioRxiv, Submitted to Journal of Neuroscience.
* *equal contribution*

2024 **S.Nougaret, L.Ferrucci, F.Ceccarelli, S.Sacchetti, D.Benozzo, V.Fascianelli, R.C.Saunders, L.Renaud, A. Genovesio**, *Neurons in the monkey frontopolar cortex encode learning stage and goal during a fast learning task*, PLoS Biology.

2023 **F.Xia*, V.Fascianelli*, N.Vishwakarma, F.G.Ghinger, S.Fusi, M.A.Kheirbek**, *Neural signatures of stress susceptibility and resilience in the amygdala-hippocampal network*, bioRxiv.
* *equal contribution*

2022 **L.Ferrucci, S.Nougaret, F.Ceccarelli, S.Sacchetti, V.Fascianelli, D.Benozzo, A.Genovesio**, *Social monitoring of actions in the macaque frontopolar cortex*, Progress in Neurobiology.

2021 **S.Nougaret, V.Fascianelli, S.Ravel, A.Genovesio**, *Intrinsic timescales across the basal ganglia*, Scientific Reports .

2020 **V.Fascianelli, L.Ferrucci, S.Tsujimoto, A.Genovesio**, *Neural correlates of strategy switching in the macaque orbital prefrontal cortex*, Journal of Neuroscience.

2019 **V.Fascianelli, E.Marcos, S.Tsujimoto, A.Genovesio**, *Autocorrelation structure in the macaque dorsolateral, but not orbital or polar, prefrontal cortex predicts response-coding strength in a visually cued strategy task*, Cerebral Cortex .

2018 **R.Cirillo*, V.Fascianelli*, L.Ferrucci, A.Genovesio**, *Neural intrinsic timescales in the macaque dorsal premotor cortex predict the strength of spatial response coding*, iScience.
* *equal contribution*

Physics selected publications[1]

2024 **EC.Gil et al.**, *Measurement of the $K^+ \to \pi^+\gamma\gamma$ decay*, Physics Letters B.

2023 **EC.Gil et al.**, *Performance of the NA62 trigger system*, Journal of High Energy Physics.

2023 **EC.Gil et al.**, *A search for the $K^+ \to \mu^-\nu e^+e^+$ decay*, Physics Letters B.

2022 **EC.Gil et al.**, *A measurement of the $K^+ \to \pi^+\mu^+\mu^-$ decay*, Journal of High Energy Physics.

2022 **EC.Gil et al.**, *Searches for lepton number violating $K^+ \to \pi^-\pi^0 e^+e^+$ decays*, Physics Letters B.

2022 **A.Akmete et al.**, *High level performance of the NA62 RICH detector*, Nuclear Intruments and Methods In Physics Research.

2021 **R.Aliberti et al.**, *Search for Lepton Number and Flavor Violation in K^+ and π^0 Decays*, Physical Review Letters.

2021 **E.C Gil et al.**, *Measurement of the very rare $K^+ \to \pi^+\nu\overline{\nu}$ decay*, Journal of High Energy Physics.

2021 **EC.Gil et al.**, *Search for a feebly interacting particle X in the decay $K^+ \to \pi^+X$*, Journal of High Energy Physics.

2021 **F.Ambrosino et al.**, *Search for Lepton Number and Flavor Violation in and Decays*, Physical Review Letters.

2020 **EC.Gil et al.**, *Search for heavy neutral lepton production in K^+ decays to positrons*, Physics Letters B.

2020 **EC.Gil et al.**, *Final performances of the NA62 RICH detector*, Journal of Instrumentations.

2019 **EC.Gil et al.**, *Search for production of an invisible dark photon in π^0 decays*, Journal of High Energy Physics.

2019 **EC.Gil et al.**, *First search for $K^+ \to \pi^+\nu\overline{\nu}$ using the decay-in-flight technique*, Physics Letters B.

2018 **R.Aliberti et al.**, *Search for heavy neutral leptons at the NA62 experiment at CERN*, International Journal of Modern Physics A.

2017 **EC.Gil et al.**, *The Beam and detector of the NA62 experiment at CERN*, Journal of instrumentation.

2017 **G.A.Rinella et al.**, *NA62 Charged Particle Hodoscope. Design and performance in 2016 run*, Journal of instrumentation.

[1] For a complete list of all publications refer to My Google Scholar page