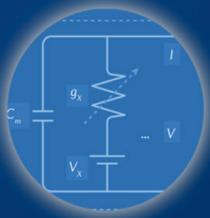
Dendrites 2022

EMBO Workshop
Dendritic anatomy, molecules and function

Heraklion, 23-26 May 2022



Day 1 – 23 May 2022

08:30-12:30 Registration

09:00-09:15 Opening Remarks
Organizers

Session 1: Dendritic properties across rodent, primate and human neurons

Chair: Dieter Jaeger and Judit Makara

09:15-10:00 Cortical computation and the apical dendritic axis
Matthew Larkum

10:00-10:45 Biophysical scaling rules for single neuron computation across mammalian cortices
Mark Harnett

10:45-11:00 Short Talk 1: Connectomic comparison of non-human primate and human cortex to mouse
Sahil Loomba

11:00-11:30 Coffee break

11:30-12:15 Modelling neuronal morphology
Hermann Cuntz

12:15-13:00 Modelling dendritic computations in rodents and humans
Yiota Poirazi

13:00-13:15 Short talk 2: Dendritic spikes, xor, and much more - insights from recordings of human neurons
Albert Gidon

13:15-15:00 Lunch break

15:00-17:00 Poster Session 1

17:00-17:30 Coffee break

Session 2: Synaptic adaptations in active dendrites

Chair: Richard Naud

17:30-18:15 How precise is synaptic plasticity?
Terry Sejnowski

18:15-19:00 Ion flux-independent NMDA receptor signaling in dendritic plasticity
Karen Zito

19:00-19:15	Short talk 3: A normative model for synaptic plasticity in apical dendrites of pyramidal cells that enables learning of probabilistic predictions Wolfgang Maass
19:30-21:30	Welcome Reception

Day 2 – 24 May 2022

Session 3: **Dendritic nonlinearities and their impact on hippocampal circuits**

Chair: Bartlett Mel and Jackie Schiller

09:00-09:45	Species-dependent, cell type-specific, and developmentally regulated connectivity in the hippocampal CA3 network Peter Jonas
09:45-10:30	Diversity of dendritic Ca2+ spikes in hippocampal pyramidal neurons Judit Makara
10:30-10:45	Short talk 4: Superresolution Physiological Imaging in Dendrites Or Shemesh
10:45-11:15	Coffee break
11:15-12:00	New vistas in dissecting dendritic mechanisms of navigation and learning in the hippocampus Attila Losonczy
12:00-12:45	An entorhinal cortex instructive signal shapes experience-dependent CA1 representations Christine Grienberger
12:45-13:00	Short talk 5: Compartment-specific tuning of dendritic feature selectivity by intracellular Ca2+ release Justin O'Hare
13:00-14:30	Lunch break
14:00-15:30	Coffee break
14.30-16.00	Meet the speakers event
16:00-23:00	Excursion to the beach + conference dinner

Day 3 – 25 May 2022

Session 4: **Dendrites in development and cortical computations**

Chair: Christine Grienberger and Robert Sachdev

09:00-09:45 Dendritic growth and emergence of synaptic input organization during development
Julijana Gjorgjieva

09:45-10:30 Single neuron computations in vivo
Michael Häusser

10:30-10:45 Short talk 6: Understanding branch-specific parallel fiber computation in a Purkinje cell through a heterogenous ion channel density model
Gabriela Capo Rangel

10:45-11:15 Coffee break

11:15-12:00 Cell type and input selective non-linear dendritic responses in layer 2/3 pyramidal neurons of the somatosensory cortex
Anthony Holtmaat

12:00-12:45 Cell type dendritic computations in primary motor cortex
Jackie Schiller

12:45-13:00 Short talk 7: Inhibitory top-down projections from zona incerta control neocortical memory.
Anna Schroeder

13:00-14:30 Lunch Break

14:30-16:30 Poster Session 2

16:30-17:00 Coffee break

Session 5: **Dendrites and inhibition**

Chair: Naoya Takahashi

17:00-17:45 Structural plasticity of excitatory and inhibitory synapses associated with excitatory and inhibitory learning
Linnaea Ostroff

17:45-18:30 Interneuron dendritic integration and its implication in neuronal and circuit
David DiGregorio

18:30-18:45 Short talk 8: Lateral entorhinal cortex inputs modulate hippocampal dendritic excitability by recruiting a local disinhibitory microcircuit
Olesia Bilash

Day 4 – 26 May 2022

Session 6: Molecular processes in dendrites

Chair: Linnaea Ostroff

09:00-09:45 Ready for plasticity
Kristen Harris

09:45-10:00 Short talk 9: In vivo visualization of protein synthesis dynamics in dendrites of the mouse cortex
Teresa Spanò

10:00-10:15 Short talk 10: Early visual experience drives a decline in NMDAR-dependent properties in thalamorecipient dendrites of L5 pyramidal neurons
Courtney Yaeger

10:15-10:45 Coffee break

Session 7: Where do we go from here?

Chair: Organizers

10:45-11:30 A brief history and a concise future of modeling human neurons
Idan Segev

11:30-13:00 Round table on the future of dendritic research

13:00-14:30 Lunch break

Session 8: Career development issues

14:30-15:10 Thoughts towards preparing an effective talk
Kristen Harris

15:10-15:50 Towards work-life balance
Yiota Poirazi

15:50-16:30 Scientific life tips
Kristen Harris

16:30-17:00 Coffee break

17:00-18:00 Towards secure and flexible careers for young scientists - a discussion
Matthew Larkum

18:00-18:30 Best poster awards & closing remarks

POSTER SESSION 1

Anatomy and Connectomics

1 Form-function relation: implications of synaptic design on pattern separation in hippocampal neurons
Nishant Singh, Suhita Nadkarni

2 Paired spine Ca2+ imaging and large-scale extracellular HD-MEA recordings for the identification of monosynaptic connections
Xiaohan Xue, Alessio Paolo Buccino, Sreedhar Saseendran Kumar, Andreas Hierlemann, Julian Bartram

Artificial Networks and Neuromorphic Computing

3 Single neurons can still perform machine learning tasks despite the addition of biological constraints
Ilenna Jones, Konrad Kording

4 Optical Dendritic Unit
Silvia Ortín, Miguel Cornelles, Apostolos Argyris, **Claudio Mirasso**

5 NEUREKA: A smart, hybrid neural-silico-computo device for drug discovery
George Kastellakis, Yiota Poirazi

6 Empowering artificial neural networks by adding biological dendrites
Spyridon Chavlis, Panayiota Poirazi

7 Effects of biologically inspired activation functions on Artificial Neural Networks
Georgina Nouli, Spyridon Chavlis, Athanasia Papoutsi, Panayiota Poirazi

8 Dendritic gated networks: A rapid and efficient learning rule for biological neural circuits
Dimitar Kostadinov, Eren Sezener, Agnieszka Grabska -Barwińska, Matthew Botvinick, Claudia Clopath, Michael Häusser, Peter Latham

9 Key biological features that help a spiking neural network perform image discrimination
Nikos Malakasis, Spyridon Chavlis, Panayiota Poirazi

10 Parallel and recurrent cascade models as a unifying force for understanding sub-cellular computation
Emerson Harkin, Peter R Shen, Anish Goel, Blake A. Richards, **Richard Naud**

Dendritic Computation and Input Integration

11 Specialised dendrites support orientation tuning in mouse visual cortex
Federico Rossi, Anyi Liu, Naureen Ghani, Charu Reddy, Kenneth Harris, Matteo Carandini

12 Feature selectivity of collicular wide-field neurons is generated by stratified inputs and nonlinear dendritic filtering
Norma Kühn, Chen Li, Natalia Baimacheva, Janne Zimmer, Katja Reinhard, Vincent Bonin, Karl Farrow

13 Motor thalamic inputs instruct frontal cortical activity in goal-directed behavior
Dieter Jaeger, Naoya Takahashi, Sara Moberg, Robert Sachdev, Matthew Larkum

14 Voltage compartmentalization by dendritic spines in vivo
Victor Hugo Cornejo, Netanel Ofer, Rafael Yuste

15 Single presubicular layer 3 neurons integrate retrosplenial input with thalamic head direction signals
Louis Richevaux, Merie Nassar, Nathalie Sol-Foulon, **Desdemona Fricker**

16 Hippocampal dendritic selectivity during spatial remapping
Jason Moore, Shannon Rashid, Naomi Codrington, Dmitri Chklovskii, Jayeeta Basu

17 Experimental evidence for interneuron computations using sublinear dendritic operations
Alexandra Tran-Van-Minh, **Romain Caze**, Boris Gutkin, David DiGregorio

18 Cholinergic modulation of dendritic integration in primary visual cortex of mice
Mario Galdamez, Erin Neyhart, Na Zhou, Cameron Smith, Jacob Reimer

19 Dendritic activity in human and mouse neocortical interneurons.
Sarah Duverdin, Albert Gidon, Sabine Grosser, Martin Holtkamp, Pawel Fidzinski, Julia Onken, Arend Koch, Imre Vida, Matthew Larkum

20 Understanding branch-specific parallel fiber computation in a Purkinje cell through a heterogenous ion channel density model
Gabriela Capo-Rangel, Erik De Schutter

21 Ion channel distributions in cortical neurons are optimized for energy-efficient active dendritic computations
Arco Bast, Marcel Oberlaender

22 Investigating the effect of anatomical and E/I input heterogeneity on CA1 pyramidal cell computation with a biophysical model
Simone Tasciotti, Spyridon Chavlis, Daniel Iascone, Franck Polleux, Attila Losonczy, Panayiota Poirazi

23 Mechanisms of burst firing in models of hippocampal pyramidal cells
Luca Tar, Sára Sáray, Szabolcs Káli

24 Multi-task learning with contextual NMDA spikes
Matthias Tsai, Willem Wybo, Bernd Illing, Jakob Jordan, Abigail Morrison, Walter Senn

25 Activity-dependent growth of cortical dendrites through the formation and removal of synapses
Lucas Euler, Julijana Gjorgjieva, Jan H. Kirchner

26 Synergistic interactions between NMDA receptors, calcium, and calcium-activated potassium channels regulate complex spike bursting in CA3 pyramidal neuron models
Rituparna Roy, Rishikesh Narayanan

27 A tale of two trees: modeling apical and basal tree contribution to L2/3 V1 pyramidal cell orientation selectivity
Konstantinos-Evangelos Petousakis, Jiyoung Park, Athanasia Papoutsi, Stelios Smirnakis, Panayiota Poirazi

28 Neuronal morphology affects network synchronisation state via dynamical excitability type
Robert Gowers, Susanne Schreiber

29 The Tripod neuron: a minimal model of dendritic computation
Alessio Quaresima, Dick van den Broek, Hartmut Fitz, Renato Duarte, Peter Hagoort, Karl-Magnus Petersson

30 Active dendrites can support reliable spiking computations
Thomas Burger, Michael Rule, Timothy O'Leary

31 Parallel functional architectures within a single dendritic tree
Young Joon Kim, **Balázs Ujfalussy**, Máté Lengyel

32 Dendritic spikes, xor, and much more - insights from recordings of human neurons
Albert Gidon, Matthew Larkum

33 Modeling dendritic integration in pyramidal tract neurons in motor cortex in normal and parkinsonian conditions
Taylor Kahl, Dieter Jaeger

Dendritic Computation, Anatomy and Connectomics

34 Synaptic partners of long-range innervation in mouse cerebral cortex
Ali Karimi, Florian Drawitsch, Moritz Helmstaedter

35 Topological insights on neuronal morphologies
Lida Kanari, Kathryn Hess, Henry Markram

Dendritic Computation and Network Dynamics

36 Functional connectivity and dendritic integration of cortico-cortical feedback are co-organized in visual cortex
Dustin Herrmann, Mehmet Fişek, Alexander Egea-Weiss, Matilda Cloves, Lisa Bauer, Lloyd E. Russell, Michael Häusser

37 Dendritic basis for effective pattern separation in a memory and learning circuit
André Ferreira Castro, Ashok Litwin-Kumar, Maarten Zwartz, Albert Cardona

38 Learning to harness dendritic computations
Brendan Bicknell, Kevin Sheng, Michael Häusser

Inhibition – D Inhibition

39 Moved to Session 2, #33

40 Interneuron-specific dendritic computations in the neocortex
Annunziato Morabito, Joana Lourenço, Alberto Bacci, David A. DiGregorio, Nelson Rebola

41 Optimizing interneuron circuits for compartment-specific feedback inhibition
Joram Keijser, Henning Sprekeler

Methods and Tools

42 Systematic validation of the somatic behavior and signal propagation and integration in dendrites of models of hippocampal neurons
Sára Sáray, Christian Rössert,Shailesh Appukuttan, Andrew Davison, Eilif Muller, Tamás Freund,Szabolcs Káli

43 A mesh decomposition framework for automated proofreading and morphological analysis of neuronal EM reconstructions
Brendan Celii, Sven Dorkenwald, Casey Schneider-Mizell, Forrest Collman, Nuno Costa, Clay Reid, Sebastian Seung, Xaq Pitkow, Andreas Tolias, Microns Consortium, Jacob Reimer

44 Adding bioinspired dendritic mechanisms to spiking neural networks
Michalis Pagkalos, Spyridon Chavlis, Panayiota Poirazi

45 Data-driven reduction of dendritic morphologies with preserved dendro-somatic responses
Willem Wybo, Jakob Jordan, Benjamin Ellenberger, Ulisses Mengual, Thomas Nevian, Walter Senn

46 New robust measures for pattern separation in dendrites, neurons, and circuits
Alexander Bird, Hermann Cuntz, Peter Jedlicka

47 Superresolution physiological imaging in dendrites
Or Shemesh, Changyang Linghu, Chih-Chieh (Jay) Yu, Lukas Fischer, Burcu Guner-Ataman, Orhan Tunç Çeliker, Kiryl Piatkevich , Demian Park, Daman Rathore, Pierre Fabris, Asmamaw T Wassie, Kirill Volynski, Xue Han, Mark Harnett, Edward Boyden

Network Dynamics

48 Spatio-temporal membrane potential and resistive current reconstruction from parallel multielectrode array and intracellular measurements in single neurons
Domokos Meszéna, Anna Barlay, Dorottya Cserpán, Kinga Tóth, Lucia Wittner, István Ulbert, Zoltán Somogyvári

49 Modelling and dynamics of the CA1-CA3 circuit of the hippocampus
Claudio Mirasso, **Jaime Sanchez-Claros**, Santiago Canals

50 Parvalbumin interneuron dendrites enhance robustness of gamma oscillations
Koen Vervaeke, Hua Hu, **Birgit Kriener**

POSTER SESSION 2

Anatomy and Connectomics

1 Connectomic comparison of non-human primate and human cortex to mouse
Sahil Loomba, Jakob Straehle, Vijayan Gangadharan, Natalie Heike, Abdelrahman Khalifa, Alessandro Motta, Niansheng Ju, Meike Sievers, Jens Gempt, Hanno S. Meyer, Moritz Helmstaedter

2 Unbalanced excitatory/ inhibitory synaptic input onto hippocampal dendrites in the aged brain
Lyndsey Kirk, Julian Falco, Tommy Liu, Vivek Mathesh, Mireya Mota, Kristen Harris

3 Synaptic morphology and innervation pattern of layer 5 corticothalamic axons in higher order posterior medial nucleus of thalamus
Vandana Sampathkumar, Andrew Miller-Hansen, Briana J Carroll, S. Murray Sherman, Narayanan Kasthuri

4 Common sense: sex-similarity in sensory feedback despite extreme motor connectivity differences in the vocal organ of a sexually dimorphic songbird
Joseph Gogola, Narayanan (Bobby) Kasthuri

5 Control of neocortical memory by long-range inhibition in layer 1
Anna Schroeder, M. Belen Pardi, Joram Keijser, Tamas Dalmay, Erin Schuman, Henning Sprekeler, Johannes Letzkus

6 Large volume EM analysis of synaptic development on adult-born granule cell dendrites
Anastasia Sorokina, Vandana Sampathkumar, Douglas GoodSmith, Narayanan (Bobby) Kasthuri

7 Filopodia contain recruitable silent synapses in the adult neocortex
Dimitra Vardalaki, Mark Harnett

8 Synaptic development in the mouse and Rhesus macaque
Gregg Wildenberg, Hanyu Li, Vandana Sampathkumar, Anastasia Sorokina, Narayanan (Bobby) Kasthuri

Dendritic Computation and Input Integration

9 Dendritic mechanisms of direction selectivity in the mammalian retina
Swen Oosterboer, Hector Ledesma, Sui Wang, Michael Lin, Wei Wei

Inhibition – Disinhibition

10 Gain modulation of spatially tuned neurons by VIP-expressing inhibitory cells
Nora Lenkey, Ann Christin Garvert, Mate Neubrandt, Koen Vervaeke

11 Cooperation between two experience-regulated enhancers maintains visual processing by controlling E/I ratio in VIP interneurons
Ori Roethler Eran Zohar, Keti Cohen -Kashi, Ivo Spiegel

Molecular Analysis

12 Sub-neuronal expression & synaptic localization of mena RNP in the postnatal mouse CNS
Emmanouil Agrymakis, Elena Vorgia, Niki Linardou, Marina Vidaki

13 Dendritic spine density scales with microtubule number in rat hippocampal dendrites
Kristen Harris, Dusten Hubbard, Masaaki Kuwajima, Wickliffe Abraham, Jared Bowden, Kristen Harris, Andrea Haessly, John Mendenhall, Patrick Parker, Bitao Shi, Josef Spacek

14 Investigating the diversity of excitatory synapses – excitatory vs Parvalbumin-positive neurons
Daniela Hacker, Michael Bucher, Marina Mikhaylova

15 Dendritic structure of adult neurons is maintained through continual gene-regulation
Dipannita Sarkar, Mohammad Shariq, Deepanjali Dwivedi, Nirmal Krishnan, Upinder S. Bhalla, Hiyaa S. Ghosh

16 Towards classification of synaptic types by multi-round protein nano-localization in intact, thick tissue
Boaz Mohar, Amy Hu, Nelson Spruston, Karel Svoboda, Paul Tillberg

Network Dynamics

17 Cortical dynamics during flexible behavior
Hatem Oraby, **Mostafa Nashaat**, Sek Teng Goh-Sauerbier, Ioanna Pandi, Athanasia Papoutsi, Panayiota Poirazi, Matthew Larkum

18 Functional properties of distinct cell classes in the prefrontal and parietal cortices
Danai Pantazopoulou, Panagiotis Sapountzis, Georgia Gregoriou

19 Priming target color and position are implemented by different mechanisms both in visual and prefrontal cortex
Aikaterini Sifaki, Sofia Paneri, Georgia Gregoriou

20 State-dependent electrical signaling of neuronal dendrites in the hippocampus
Adrian Negrean, Zhenrui Liao, Deborah Li, Catalina Yang, Donald Holder, Natalie McClain, Guofeng Zhang, Stephen Evans, Mariya Chavarha, Michael Lin, Attila Losonczy

Pathological Alterations, Molecular Analysis

21 Mechanistic characterization of dendritic pathology in a mouse model of MS.
Adinda Wens

22 Investigating the dendritic calcium dynamics in the Scn2a+/- autism mouse model
Hao Wu, Kevin Bender, Alex Kwan

23 Graphene oxide nanoflakes prevent potentiation at amygdala synapses: a novel tool to block dysfunctional plasticity in anxiety disorders.
Elisa Pati, Giada Cellot, Audrey Franceschi Biagioni, Kostas Kostarelos, Laura Ballerini

Plasticity, Learning and Memory

24 Alignment of visual features in binocular cortical circuits through experience-dependent plasticity
Katya Tsimring, Kyle Jenks, Dae Hee Yun, Jose Zepeda, Jacque Ip, Kwanghun Chung, Mriganka Sur

25 Differential roles of different subclasses of cortical layer 5 pyramidal neurons in associative learning
Sara Moberg, Naoya Takahashi, Matthew Larkum

26 Co-allocation to overlapping dendritic branches in the retrosplenial cortex integrates memories across time
Megha Sehgal, Daniel Almeida, George Kastellakis, Sungsoo Kim, Jinsu Lee, Won Do Heo, Panayiota Poirazi, Joahua Trachtenberg, Alcino Silva

27 Imaging in vivo of individual hippocampal synaptic sub-groups
Alessandro Francesco Ulivi, Hannah Klimmt, Bhargavi Murthy, Stefanos Somatakis, Alon Chen, Alessio Attardo

28 Early visual experience drives a decline in NMDAR-dependent properties in thalamorecipient dendrites of L5 pyramidal neurons
Courtney Yaeger, Dimitra Vardalaki, Norma Brown, Mark Harnett

29 Spatial regulation of coordinated excitatory and inhibitory synaptic plasticity at dendritic synapses
Massimo Ruben, Tiziana Ravasenga, Vincenzo Regio, Alice Polenghi, Enrica Maria Petrini, Andrea Barberis

30 Rapid synaptic plasticity contributes to the emergence of task-relevant place-cell firing
Ching-Lung Hsu, Xinyu Zhao, Nelson Spruston

31 Metabotropic acetylcholine receptors gate synaptic transmission and plasticity at Schaffer collateral synapses
Rohan Sharma, Suhita Nadkarni

32 A normative model for synaptic plasticity in apical dendrites of pyramidal cells that enables learning of probabilistic predictions
Wolfgang Maass, Arjun Rao, Robert Legenstein, Anand Subramoney

33 Lateral entorhinal cortex inputs modulate hippocampal dendritic excitability by recruiting a local disinhibitory microcircuit
Olecia Bilash, Spyridon Chavlis, Panayiota Poirazi, Jayeeta Basu

34 Biologically-based, local learning rule can solve the nonlinear feature binding problem in multicompartmental models of striatal projection neurons
Daniel Trpevski, Zahra Khodadadi, Jeanette Hellgren Kotaleski

35 Structural plasticity at excitatory synapses along interneuron dendrites in adult hippocampal area CA1
Michael Chirillo, Seth Weisberg, Kristen Harris

36 Cell assemblies, calcium-based plasticity and synapse clustering in a detailed, large-scale cortical model in in vivo-like state
András Ecker, Daniela Egas Santander, Michael W. Reimann

37 The role of dynamic inhibitory synapses for coding surprise in the retina
Simone Ebert, Thomas Buffet, Olivier Marre, Bruno Cessac

38 Plasticity and learning in a computational network model of dendritic calcium-evoked bursting neurons
Vladislav Sekulic, Shiyun Dong, Thomas J. McHugh

39 Role of layer 1 input to pyramidal cell tuft dendrites in anterolateral motor cortex during action selection
Eduardo Maristany de las Casas, Christian Ebner, Smriti Sharma, Marti Ritter, Robert Sachdev, Dieter Jaeger, Matthew Larkum

40 Compartment-specific tuning of dendritic feature selectivity by intracellular Ca2+ release
Justin O'Hare, Kevin Gonzalez, Stephanie Hansen, Yusuke Hiki, Kayashi, Victoria Hewitt, Heike Bickkus, Miklos Szoboszlay, Sebastian Rototti, Tristan Geiller, Adrian Negrean, Vikas Chelur

40 Interneuron-specific dendritic computations in the neocortex

Plasticity, Learning and Memory, Inhibition – Disinhibition

41 Dendritic signaling pathways underlying endocannabinoid-mediated inhibitory bouton growth
Lotte Herstel, Tom Coopmans, Hai Yin Hu, Dennis Kruijssen, Corette Wierenga

42 Sensory-induced transcription maintain visual processing by normalising E/I-ratio every day
Emmanouil Tsivourakis, Dahlia Kushinsky

43 Temporally recurrent cholinergic inputs induce local hippocampal plasticity through feedforward disinhibition
Inês Guerreiro, Zhenglin Gu, Jerrel Yakel, Boris Gutkin

44 Local dendritic balance enables learning of efficient representations in networks of spiking neurons
Lucas Rudelt, Fabian Mikulasch, Viola Priesemann

Plasticity, Learning and Memory, Molecular Analysis

45 Reverse engineering of the synaptic tagging and capture mechanisms
Macarena Gomez de Salazar, Magnus Kjaergaard

46 The prevalence and specificity of local protein synthesis during neuronal synaptic plasticity
Chao Sun, Andreas Nold.Claudia Fusco, Vidhya Rangaraju, Tatjana Tschumatchenko, Mike Heilemann, Erin Schuman

47 The spine apparatus organelle mediates TNFα-induced synaptic plasticity
Dimitrios Kleidonas, Andreas Vlachos

48 In vivo visualization of protein synthesis dynamics in dendrites of the mouse cortex
Teresa Spanò, Paul G. Donlin-Asp, Erin M. Schuman

49 Detailed modelling of synaptic plasticity-related biochemical pathways in a CA1 pyramidal cell spine head
Gábor Farkas, Luca Tar, Sára Sáray, Szabolcs Ká li

50 Synaptic memory encoding: using activity-dependent reporters of synaptic potentiation to map hippocampal memory engrams
Francesca Chiara Latini, Ajesh Jacob, Mariachiara Di Caprio, Andrea Faraone, Marco Mainardi, Antonino Cattaneo

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