Ahmed El Hady

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EDUCATIONAL BACKGROUND:

October 2008 – March 2013	PhD student, Department of Non Linear dynamics, ,*Max Planck Institute for Dynamics and Self Organization*, Goettingen, Germany. Advisors: Prof. Fred Wolf / Prof. Theo Geisel Thesis title: "*Studies of cultured neuronal networks using light activated ion channels and pumps*". (PhD defended October 2012, PhD title conferred March 2013)
October 2007 – August 2008	Master courses, *International Max Planck Research School of Neurosciences* , Goettingen, Germany.
2001 – 2006	Faculty of Pharmacy, Cairo university B.Sc. (Honor), Pharmaceutical sciences

Schools and programs:

April 20 – April 26, 2013	"Value centered leadership" Aspen seminar, *Aspen Institute*.
November 26 – December 7, 2012	"Quantitative systems biology" winter school, *International Center for Theoretical Physics*, Trieste, Italy.
October 23 – November 7, 2010	"Emerging techniques in neuroscience" program, *Kavli Institute for Theoretical Physics*, Santa Barbara, California
August 2 – 30, 2009	"Methods in computational neuroscience" summer school, *Marine Biological Laboratory*, Woods hole, Massachusetts.

PROFESSIONAL EXPERIENCE:

November 2021	Principal investigator, Center for Advanced study of collective behavior, University of Konstanz.
September 2014 – Now	HHMI Research Associate, Princeton Neuroscience Institute (Prof Carlos Brody research group), Princeton University, New Jersey, United States of America.
April 2014 – September 2014	Postdoctoral fellow, Max Planck Institute for Biophysical chemistry, Department of Nanobiophotonics (Prof. Stefan Hell Department), Goettingen, Germany.
March 2013 – April 2014	Postdoctoral fellow, Max Planck Institute for Dynamics and Self organization & Cellular Basis of Sensory Processing Research

Center, Goettingen, Germany.

TECHNICAL SKILLS:

- **Experimental skills:**
    - **In Vitro techniques:** Primary neuronal cultures, In vitro multielectrode array recordings, Optogenetics, Confocal & fluorescence microscopy, STED, Basic molecular biology techniques (cloning, site directed mutagenesis, western blot, PCR, RT-PCR, Microarray analysis), Immunocytochemistry.
    - **In Vivo techniques:** In vivo electrophysiology, functional ultrasound imaging, Microwire array implant, ultrawide craniotomy for functional imaging, rat behavioral training in operant conditioning chambers, marmoset vocalization assays.
- **Programming skills:** Matlab, NEURON, Python.

AWARDS AND HONORS

- Excellence award for promotion of the Max Planck Society (2007 - 2008)
- Georg Lichtenburg Neurosenses fellowship (2009 - 2012)
- Future Med Singularity University 2011 Scholarship
- A.T. Kearney Scholar at Falling Walls Lab Berlin (2012)
- Adler Aspen Institute Seminar Scholarship 2013
- Winter Aspen Socrates program Scholarship 2013
- Aspen Center for Physics Scholarship 2014
- Max Planck Society Postdoctoral Fellowship 2014
- Winter Aspen Socrates program Scholarship 2016

GRANTS:

- Princeton Innovation Fund ($171,088, PIs: Asif Ghazanfar and Carlos Brody) .
- Simons Collaboration on Global Brain 2018 ($15,000 , Organizers: Yonatan Loewenstein, David Hansel, Ahmed El Hady).

TEACHING AND MENTORING EXPERIENCE:

- Teaching assistant, neuroscience literature tutorial, Princeton Neuroscience undergraduate course (Fall semester 2018)
- Teaching assistant, Methods in computational neuroscience course 2016 (*Marine Biological Laboratory, Woods Hole*, 27th July – 24th August 2016).
- Master thesis supervised:
    - Jatin Nagpal (Thesis title: "*Characterization of channelrhodopsin 2 response to fluctuating and constant light stimulation*").
- Bachelor thesis supervised:
    - Robert Samhaber (Thesis title: "*Patterned neuronal cultures on multielectrode arrays*).
- Lab rotation (bachelor) students supervised (each for two month project):

- Srinivas Gorur Shandliya (project title: " *Spike sorting of extracellular signals from Multielectrode array recordings* ").
- I – W en Chen (project title: " *Modeling channelrhodopsin 2 photocurrents*").
- Hung-en Hsia (Project title : " *Non viral transfection of channelrhodopsin 2 into neurons* ").
- Anna Trawicka : (Project title: "*Cardio specific expression of optical sensor*").
- Pooja Roa (Project title:"*Scanning ion conductance microscopy study of axon initial segment*").
- Oana Toader (Project title: "*Manipulating bursting dynamics of neuronal networks using optical neurostimulation*").
- Hugo Crucos (Project title: "*Microarray analysis of synaptic plasticity genes involved in optogenetically induced network level plasticity*").
- Ricardo Merino (Project title: "*Modulating neuronal networks' correlation structure with optogenetic stimulation*")
- Matthias Hohmann (Project title:"*NEURON platform to model neuronal plasticity*")

- Tutor, *Theoretical Neuroscience Course* , International Max Planck Research School of Neurosciences, Goettingen, Germany (January 7 – 11, 2009).

- Junior lecturer, *Translational neuroscience workshop*, Max Planck Institute for Experimental Medicine, Goettingen, Germany (June 6 – 8, 2008).

REVIEWING EXPERIENCE:

- Guest associate editor and reviewer, Frontiers in Neural Circuits.
- Guest associate editor, Frontiers in Ecology and Evolution.
- Review Editor, frontiers in computational neuroscience
- External reviewer, European Research Council grants, European Commission.
- Adhoc reviewer for PLOS one, COSYNE.

PROFESSIONAL SCIENTIFIC ACTIVITIES:

- Guest Editor (with Prof. Deborah Gordon and Jacob Davidson) of the special topic issue "Ecological perspective on decision making" in Frontiers in Evolution and Ecology.
- Co-organizer, "NeuroBridges" summer school, Cluny, France (October 2nd – October 12th, 2018)
- Co-organizer, Institute for Advanced Study – Princeton Neuroscience Institute workshop on "Mathematical Theory of Deep Learning", Princeton (March 20th , 2018).
- Co-organizer, "NeuroBridges" summer school, Cluny, France (September 3rd – September 14th, 2017)
- Co-organizer, "Timescales of dynamics in neural networks" workshop, COSYNE 2016, Snowbird, Utah (February 29th – March 1st, 2016).
- Co-organizer, "Computational neuroscience by Mediterranean" winter school, American University of Beirut, Beirut, Lebanon (18th – 22nd January, 2016).
- Co-organizer, Israeli – Arab – French "NeuroBridges" workshop on computational and systems neuroscience, Paris, France (7th – 9th September, 2015)
- Organizer, the first Israeli – Arab - German "NeuroBrigdes" workshop on computational and systems neuroscience, Goettingen , Germany (29th -31st July, 2014).
- Chair, "*Closed Loop Methodology in Neural Systems*" Technical Workshop, FENS 2014 (July 5 – 9, 2014, Milan, Italy).
- Discussion leader, *Gordon Research Seminar on Photosensory Receptors 2014* (From Biophysics and Physiology to Optogenetics and Clinical Applications, April 6 – 11, 2014, Italy).
- Guest editor (with Prof. Steve Potter and Prof. Ebehard Fetz) of the special topic issue "*Closing the loop around neural systems*" in Frontiers in Neural Circuits.
- Organizer, Bernstein focus for Neurotechnology course on "*Patterning neuronal cell cultures*", (Goettingen, Germany, September 5 – 7, 2011).

- Organizer, Goettingen Graduate School for Molecular Biosciences and Neuroscience course on "*Multielectrode array recordings*", Goettingen, Germany (January 17 – 20 , 2011).

PROFESSIONAL ASSOCIATIONS:

- Member, Society for Neuroscience

INVITED TALKS:

- "Action Waves in the Brain", Center for advanced mathematical sciences, May 2015, American University of Beirut, Lebanon
- Edmond Lily Safra Center for Brain Sciences retreat, January 2014, Ein Gedi, Israel.
- Network Biology Laboratory seminar series, January 2014, Technion, Haifa, Israel.
- EPFL computational neuroscience seminar series, September 2013, Lausanne, Switzerland.
- Max Planck Institute Florida seminar series, November 2011, Jupiter, Florida.
- Janelia farm conference on "Genetic manipulation of neuronal activity II", November 2010, Virginia, Washington.
- Neuroseminar, November 2010, Department of biomedical engineering, Georgia Institute of Technology, Altanta, Georgia.
- Donders discussions, October 2010, Nijmegen, Netherlands.
- "Timescales in neuronal population encoding and their biophysical basis" symposium, 2013 German Neuroscience Society Meeting, Goettingen, Germany.
- 2012 Gordon Research Seminar on "Photosensory receptors", Galveston, Texas.

PUBLICATIONS:

Books:

El Hady A. Closed Loop Neuroscience, Academic Press / Elsevier. October 2016.

Published Peer Reviewed Manuscripts:

Alcami P. and **El Hady A.** Axonal Computations. *Front. Cell. Neurosc*i 2019. 13:413. doi: 10.3389/fncel.2019.00413

Davidson JD, **El Hady A**. Foraging as an evidence accumulation process. PLoS computational biology. 2019 Jul 24;15(7):e1007060.

Piet AT, **El Hady A**[*,#], **Brody CD**[*,#]. Rats adopt the optimal timescale for evidence integration in a dynamic environment. Nature communications. 2018 Oct 15;9(1):4265.

Martin S, Lazzarini M, Dullin C, Balakrishnan S, Gomes FV, Ninkovic M, **El Hady A**, Pardo LA, Stühmer W, Del-Bel E. SK3 channel overexpression in mice causes hippocampal shrinkage associated with cognitive impairments. Molecular neurobiology. 2017 Mar 1;54(2):1078-91.

Samhaber R[*], Schottdorf M[*], **El Hady A[*],** Broeking K, Daus A, Thielemann C, Stuehmer W, Wolf F. Growing neuronal islands on multi-electrode arrays using an Accurate Positioning-μCP device. Journal of neuroscience methods. 2016 Jan 15;257:194-203.

El Hady A[#], Machta BB[#]. Mechanical surface waves accompany action potential propagation. Nature communications. 2015 Mar 30;6:6697.

D'Este E, Kamin D, Göttfert F, **El Hady A**, Hell SW. STED nanoscopy reveals the ubiquity of subcortical cytoskeleton periodicity in living neurons. Cell reports. 2015 Mar 3;10(8):1246-51.

Witt A, Palmigiano A, Neef A, **El Hady A**, Wolf F, Battaglia D. Controlling the oscillation phase through precisely timed closed-loop optogenetic stimulation: a computational study. Frontiers in neural circuits. 2013 Apr 17;7:49.

El Hady A[*], Afshar G[*], Bröking K, Schlüter O, Geisel T, Stühmer W, Wolf F. Optogenetic stimulation effectively enhances intrinsically generated network synchrony. Frontiers in neural circuits. 2013 Oct 22;7:167.

Potter SM, **El Hady A**, Fetz EE. Closed-loop neuroscience and neuroengineering. Frontiers in neural circuits. 2014 Sep 23;8:115.

Preprints:

El Hady A*., Neef A*., Nagpal J*., Bröking K, Afshar G., Schlüter O., Geisel T., Bamberg E., Fleischmann R., Stühmer W., Wolf F. Continuous Dynamic Photostimulation - inducing in-vivo-like fluctuating conductances with Channelrhodopsins. *arXiv:1305.7125[q-bio.NC]*

El Hady A*., Afshar G*., Geisel T., Bamberg E., Stühmer W., Wolf F. Enhancing burst activation and propagation in cultured neuronal networks by photo-stimulation. bioRxiv doi: http://dx.doi.org/10.1101/027177

*Equally contributing authors
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In preparation:

Takahashi D.*, **El Hady A.***, Urban A., Montaldo G., Ghazanfar A. Social vocal network in non-human primates.

Kilpatrick Z., Davidson J.D. , **El Hady A**. Learning to forage: a Bayesian account.

El Hady A. , Davidson J.D. , Deborah G. An ecological perspective on decision making

CONFERENCE PROCEEDINGS:

Peer-reviewed abstracts:

Piet A.*, **El Hady A.***, Brody C. Neural dynamics underlying decision making in a dynamic environment. *Society for Neuroscience conference 2018 abstract, San Diego, United States*.

Liao D.A., Zhang Y.S., Takahashi D.Y., **El Hady A.**, Ghazanfar A. The anterior cingulate cortex as a nexus for vocal communication and energy allocation in marmoset monkeys. *Society for Neuroscience conference 2018 abstract, San Diego, United States*.

Zhang Y.S., Pisano T.J., Takahashi D. , **El Hady A.** , Liao D.A, Wang S. , Ghazanfar A. Neurovascular anatomy of the marmoset brains: links to the default mode network. *Society for Neuroscience conference 2018 abstract, San Diego, United States*.

Takahashi D.*, **El Hady A.***, Urban A., Montaldo G., Ghazanfar A. Dynamic functional ultrasound imaging of socio-vocal network in marmoset monkeys. *Society for Neuroscience conference 2018 abstract, San Diego, United States*.

Davidson J., **El Hady A.** Foraging as a decision making problem: evidence accumulation and when to leave a patch. *International Society of Behavioral Ecology Conference 2018, Minnesota, USA.*

Takahashi D.*, **El Hady A.***, Urban A., Montaldo G., Ghazanfar A. (2018) Dynamical structure of socio-vocal network in marmoset monkeys. *Cosyne 2018 Abstracts, Denver, CO, USA*

Boyd-Meredith T., **El Hady A**., Tank D., Brody C. Dorsal hippocampal responses to gradual accumulation of evidence *Society for Neuroscience conference 2017 abstract, Washington DC, United States*.

Piet A., **El Hady A.**, Brody C. Rats can optimally accumulate and discount evidence for decision making in a dynamic environment. *Society for Neuroscience conference 2017 abstract, Washington DC, United States.*

Piet A., Brody C., **El Hady A**. Rats can optimally discount evidence for decision-making in a dynamic Environment. *Cosyne Abstracts 2017, Salt Lake City, USA*

Piet A., Brody C., **El Hady A.** Rats accumulate and discount evidence in a changing environment. *Society for Neuroscience conference 2016 abstract, San Diego, United States.*

Akrami A., **El Hady A.,** Brody C. (2015). Posterior parietal and prefrontal cortex involvement in a rat auditory parametric working memory task. *Cosyne Abstracts 2015, Salt Lake City USA.*

Machta B., **El Hady A.** Mechanical surface waves accompany action potential propagation. *Biophysical Journal, Volume 108, Issue 2, Supplement 1, p206a–207a, 27 January 2015.*

Machta B., **El Hady A.** Mechanical surface waves accompany action potential propagation. *APS meeting abstracts Volume 60 number 1.*

D'Este E., Kamin D., **El Hady A.**, Hell S.W. Live STED nanoscopy of the actin organization in the axon initial segment. *Society for Neuroscience conference 2014 abstract, Washington DC, United States.*

El Hady A., Stühmer W. In vitro closed loop optical network electrophysiology: an introduction. AIP Conf. Proc. (2013) 1510, 234 – 243

Neef A*., **El Hady A*.**, Lazarov E., Bröking K., Geisel T., Stühmer W., Wolf F. Non-invasive characterization of individual neurons with Continuous dynamic photo-stimulation. *Society for Neuroscience conference 2012 abstract, New Orleans, United States.*

El Hady A., Afshar G., Geisel T., Stühmer W., Wolf F. Optogenetic modification of network burst structure: a mechanistic study. *Gordon Research Conference on Photosensory receptors and Signal transduction 2012, Galveston, United States*.

Neef A., Piper C., **El Hady A.** Imaging of optogenetically induced pH changes. *Janelia farm conference on biological sensors 2012, Virginia, United States.*

Bröking K., **El Hady A.**, Fleischmann R., Geisel T, Wolf F. Photoelectric effect in multielectrode arrays. *Proc. Of the 8th International meeting on substrate-integrated micro electrode arrays, Reutlingen germany. p. 230 – 231*.

Neef A.*, **El Hady A*.**, Nagpal J, Bröking K, Afshar G., Schlüter O., Geisel T., Bamberg E., Fleischmann R., Stühmer W., Wolf F. Continuous dynamic photostimulation – inducing in – vivo like fluctuating conductances with Channelrhodopsins. *J Mol Neurosci (2012) 48 (Suppl 1):S84-S85.*

Afshar G*, **El Hady A*.**, Schlüter O., Geisel T., Stühmer W., Wolf F. Optogenetic modification of network burst structure. *Society for Neuroscience conference 2011 abstract, Washington DC, United States.*

El Hady A., Afshar G., Schlüter O., Geisel T., Stühmer W., Wolf F. Optogenetic induction of network level plasticity. *Front. Comput. Neurosci. Conference Abstract: BC11: Computational Neuroscience &*

Neurotechnology Bernstein Conference & Neurex Annual Meeting 2011.

El Hady A., Broeking K., Afshar G., Schlüter O., Stühmer W., Wolf F**.** In Vitro Closed loop Optical Electrophysiology of Networks I: Whole field illumination Paradigm *Proc. Of the 7th International meeting on substrate integrated micro-electrode arrays, Reutlingen, Germany, p. 253 – 255.*

Other abstracts:

Afshar G.*, **El Hady A**.* ,Geisel T., Stuehmer W., Wolf F. "Bursting dynamics in optically stimulated neuronal networks " .German Neuroscience Society Meeting , Goettingen, Germany (March 25 – 29, 2011)

Afshar G.*, **El Hady A.*** Schlueter O., Stuehmer W., Wolf F. " Adaptation and state switching in optically stimulated neuronal networks", Spike frequency adaptation workshop, M ax Planck Institute for Physics of Complex system , Dresden, Germany (October 26 – 27, 2010)

Afshar G.*, **El Hady A.*** ,Geisel T . , Stuehmer W. , Wolf F . " Optical manipulation of neuronal networks bursting dynamics". German Physics Society annual meeting , Dresden, Germany (March 13 – 18, 2011)

Bröking K. , **El Hady A**. Fleischmann R., Geisel T. , Stühmer W., and Wolf F. Optically clamping neurons in vitro".German Physics Society annual meeting , Dresden, Germany (March 13 –18, 2011)

Bröking K., **El Hady A**., Fleischmann R., Geisel T., Stühmer W., Wolf F., and Rapp G. Virtual Networks of In Vitro Neurons by Patterned Photostimulation. German Physics Society Annual Meeting 2012.