**CURRICULUM VITAE**

**Hailan Hu**

Professor,

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**Education**

2002 Dec. Ph.D. in Neuroscience, University of California Berkeley,

with Corey Goodman

1996 Jul.B.S. in Biochemistry and Molecular Biology, Beijing University

**Postdoctoral training**

2004-2008 Cold Spring Harbor Laboratory/UCSD, with Roberto Malinow

2003-2004 University of Virginia, with Julius Zhu and Roberto Malinow

**Professional positions**

2015-present Professor, Senior Investigator, Executive director of Center for Neuroscience, Zhejiang University

2018 Dec Visiting Professor, Department of Psychiatry and Behavioral Sciences, Stanford University

2009-2015 Principal Investigator, Institute of Neuroscience, Chinese Academy of Sciences

1996-1997 Postgraduate researcher, University of California San Francisco

**Research interest**

Emotions color our lives and profoundly shape the way we think and behave. Research in my lab aims to understand how emotional and social behaviors are encoded in the brain, with a main focus on the neural circuitry underlying depression and social dominance. Specifically we are looking into three major problems: First, we study how the brain represents emotions of different valence. Through simultaneously mapping the neural activity response to rewarding and aversive stimuli in the same mouse brain and at single cell resolution, we have identified a functional valence map. Second, we search for the molecular and circuit mechanism of depression, focusing on a brain region called habenula, which encodes negative reward. We have identified several key habenula-expressing molecules that play important roles in the etiology of depression. Third, we establish animal models for studying social hierarchy in mice and explore the neural mechanism underlying the dominance trait. We are recording and manipulating neural activity during social competition to study how dominance hierarchy arises from interplay between the activity of specific neural circuits and social experience such as history of winning or losing. We are tackling these problems using combinatorial techniques including imaging, electrophysiology (both *in vitro* and *in vivo*), molecular genetics and optogenetic. We hope that these studies will shed new light on the neural basis of some essential emotional and social behaviors, and provide therapeutic implications for the treatment of emotional disorders.

**Awards and honors**

2019 IBRO-Kemali International Prize for Basic and Clinical Neuroscience

2019 Ho Leung Ho Lee Award

2018 Clinical Special lecture at SFN

2018 “TOP Ten Scientific Breakthroughs of China”

2018 ZhengXi Scholar Award

2016 Tan Jia Zhen Life Science Award

2016 14th Chinese Young Scientist Award

2015 Chang Jiang Scholar Award

2015 12th L’Oreal Women Scientist Award of China

2015 Sanofi Scholar Award

2013 Meiji Life Science Outstanding Award

2012 Chinese Distinguished Young Scholar Award

2012, 2014 Excellent Mentorship Award of Chinese Academy of Sciences

2010-2012 Shanghai Pujiang Talent Award

2009-2012 Chinese Hundred Talent Plan Award

2003-2006 Damon Runyon Foundation Postdoctoral Fellowship

2002 HHMI and IBRO fellowships for MBL Neurobiology Course

1998-2003 Howard Hughes Medical Institute Predoctoral Fellowship

**Referee for** Science, Nature, Nature Medicine, Nature Neuroscience, Neuron, Nature Communication,

eLife, Current Biology, PNAS etc.

**Committee and Editorial Service:**

2019- Council, Molecular and cellular Cognition Society

2019- Society of Neuroscience (SFN) Julius Axelrod Prize Selection committee

2018- Associate editor, Science Advances

2018- Associate editor, Science China Life Sciences

2017- F1000 faculty member

2015- 2018 Society of Neuroscience (SFN) Program Committee

2013- 2015 IBRO(Internationa Brain Organization) Alumni Committee

2009- present Reviewer for Chinese National Science Foundation Grants

2010 Reviewer for UK MRC grant

**Trainees present:**

Yan Yang (associate professor, PhD with Yuqiu Zhang at Fudan University)

Qiuhong Xin (postdoc, PhD with Toshiya Matsushima at University of Hokkaido )

Min Chen (postdoc, PhD with Bin Hu at USTC )

Yi Tan (postdoc, PhD with Gunter Hoglinger at DZNE Munich)

Jihua Wang (graduate student)

Zhengxiao Fan (graduate student)

Yiyan Dong (graduate student)

Shuangshuang Ma (graduate student)

Chao Zhang (graduate student)

Zheyi Ni (graduate student)

Diyang Zheng (graduate student)

Xiaoning Jia (graduate student)

**Postdoc and Ph.D students trained (current position):**

Kun Li (Assistant Professor, Tsing-Hua University)

Tao Zhou (Principal investigator, CAS Shenzhen Institutes of advanced technology)

Yihui Cui (Associate professor, Zhejiang University)

Fei Wang (postdoc, HHMI Janellia Farm, with Barry Dickson)

Qi Zhang (postdoc, Shanghai Mental Health Center, With Tifei Yuan)

Hong Zhu (postdoc, Emory University, with Larry Young)

Tingting Zhou (postdoc, MIT, with Guoping Feng)

**Undergraduate students trained (current position):**

Zhanmin Lin (graduate school, Erasmus Univ., Netherland)

Hexing Liang (graduate school, Johns Hopkins, US)

Shuqi Chen (graduate school, UCSD, US)

Yilan Liang (graduate school, UC Berkeley)

**Research Subjects**

[1] Neural representation of emotional valence

[2] Molecular and circuit mechanism of depression

[3] Neural circuit mechanism of social hierarchy

**Key Publications**

1. **Hu H**, Cui Y, and. Yang Y. (2020) Circuits and functions of the lateral habenula in health and disease. ***Nature Review Neuroscience,*** 21: 277–295. (invited review)
2. Cui Y, Yang Y, Dong Y and **Hu H** (2018) Decoding depression: Insights from glial and ketamine regulation of neuronal burst firing in lateral habenula. ***Cold Spring Harbor Symp Quant Biol*** Volume 83, Brain and Behavior: Order and Disorder in the Nervous System (invited review)
3. Cui Y, Hu S and **Hu H**. (2019) Lateral Habenular Burst Firing as a Target of the Rapid Antidepressant Effects of Ketamine. ***Trends in Neurosciences,***42(3), 179-191. (invited review, cover article)
4. Yang Y, Cui Y, Sang K, Dong Y, Ni Z, Ma S, **Hu H**. (2018)Ketamine blocks bursting in the lateral habenula to rapidly relieve depression. ***Nature***, 554: 317-22 (Research article, Featured by ***Nature***, ***Nat. Rev. Neuro.*** and ***Neuron***)
5. Cui Y, Yang Y, Ni Z, Dong Y, Sang K, Cai G, Foncelle A, Ma S, Sang K, Tang S, Li Y, Shen Y, Berry H, Wu S, **Hu H**. (2018)[Astroglial Kir4.1 in the lateral habenula drives neuronal bursts in](https://www.nature.com/articles/nature25752)depression. ***Nature***, 554: 323-27 (Research article, featured by ***Nature***, ***Nat. Rev. Neuro.*** and ***Neuron***)
6. Zhou TT, Zhu H, Fan ZX, Wang F, Chen Y, Liang HX, Yang ZF, Zhang L, Lin LN, Zhan Y, Wang Z, **Hu H**. (2017) History of winning remodels thalamo-PFC circuit to reinforce social dominance. [***Science***](http://science.sciencemag.org/content/sci/357/6347/162.full.pdf?ijkey=lWqZ9wLquA2sY&keytype=ref&siteid=sci), 357: 162-168 (Research article, featured by ***Nat. Rev. Neuro.***)
7. **Hu H**. (2016)Reward and aversion. ***Annual Review in Neuroscience***, 39: 297-324. (invited review)
8. LvQ, Yang L, LiG, Wang Z, ShenZ, Yu W, JiangQ, HouB, PuJ, **HuH**, Wang Z. (2015) Large-scale persistent network reconfiguration induced by ketamine in anesthetized monkeys: relevance to mood disorders. ***Biological Psychiat*ry**, 79(9):765-75.
9. Xiu JB, Zhang Q, Zhou T, Zhou TT, **Hu H**. (2014) Visualizing an emotional valence map in the limbic forebrain by TAI-FISH. ***Nature Neuroscience***, 17:1552-1559
10. Wang F, Kessels H\*, **Hu H\***. (2014) The mouse that roared - neural mechanisms of social hierarchy. ***Trends in Neuroscience*** 11:674-682 (invited review, cover article, \* co-corresponding author)
11. Li K, Zhou T, Liao L, Yang Z, Wong C, Henn F, Malinow R, Yates J, **Hu H.** (2013) βCaMKII in lateral habenula mediates core symptoms of depression. ***Science***, 341:1016-1020. (Featured by ***Nat. Rev. Neuro.*** and ***JAMA***)
12. Wang F, Zhu J, Zhu H, Zhang Q, Lin Z, **Hu H** (2011) Bidirectional control of social hierarchy by synaptic efficacy in medial prefrontal cortex. ***Science***, 334: 693-697. (Featured by ***Science***, 334: 608-9)
13. **Hu H**, Real E, Takamiya K, Kang MG, Ledoux J, Huganir R, Malinow R. (2007) Emotion Enhances Learning via Norepinephrine Regulation of AMPA-Receptor Trafficking. ***Cell*** 131: 160-73. (Featured by ***Nature*** Journal club and ***Nat. Rev. Neurosci.***)

**Other Publications**

1. Han X; Zhou Z; Fei L; Sun H; Wang R; Chen Y; Chen H; Wang J; Tang H; Ge W; Zhou Y; Ye F; Jiang M; Wu J; Xiao Y; Jia X; Zhang T; Ma X; Zhang Q; Bai X; Lai S; Yu C; Zhu L; Lin R; Gao Y; Wang M; Wu Y; Zhang J; Zhan R; Zhu S; **Hu H**; Wang C; Chen M; Huang H; Liang T; Chen J; Wang W; Zhang D; Guo G. (2020) Construction of a human cell landscape at single-cell level. ***Nature*** 581 (7808), 303-309
2. Jiang J, Wang Z, Dong YY, Yang Y, Ng CH, Ma S, Xu Y, **Hu H**, Hu S. A statistical analysis plan for a randomized clinical trial to evaluate the efficacy and safety of ethosuximide in patients with treatment-resistant depression. ***Medicine*** 98 (31)
3. Guo B, Chen J, Chen Q, Ren K, Feng D, Mao H, Yao H, Yang J, Liu H, Liu Y, Jia F, Qi C, Lynn-Jones T, **Hu H**, Fu Z, Feng G, Wang W, Wu S. (2019) [Anterior cingulate cortex dysfunction underlies social deficits in Shank3 mutant mice.](https://www.ncbi.nlm.nih.gov/pubmed/31332372) ***Nat Neurosci.*** 22(8):1223-1234.
4. Gao Z and **Hu H**. (2019) Star-like cells drive hyperactivity. ***Nature*** (invited News and Views)
5. Dong YY and **Hu H**. (2019) Taming the “black dog” by light – a retina-habenula circuit mechanism unveiled. ***Neuron***, 102(1):3-5. (invited preview)
6. Fan Z, Zhu H, Zhou T, Wang S, Wu Y and **Hu H**. (2019) Using the tube test to measure social hierarchy in mice. ***Nature Protocols***, 14(3) 819-831.
7. Shen C, Zheng D, Li K, Yang J, Pan H, Yu X, Fu J, Zhu Y, Sun Q, Tang M, Zhang Y, Sun P, Xie Y, Duan S, **Hu H**, Li X. (2019) Cannabinoid CB1 receptors in the amygdalar cholecystokinin glutamatergic afferents to nucleus accumbens modulate depressive-like behavior. ***Nature Medicine,*** 25(2) , 337-349.
8. He Q, Wang J, **Hu H**.Illuminating the activated brain: Emerging activity-dependent tools to capture and control functional neural circuits. ***Neuroscience bulletin*** 35 (3), 369-377
9. Ni Z and **Hu H**. (2018) Let it go: central neural control of urination. ***Nature Neuroscience***, 21: 1499-1501 (invited commentary)
10. Huang WH, Wang DC, Allen WE, Klope M, **Hu H**, Shamloo M, Luo LQ. (2018) Early adolescent Rai1 reactivation reverses transcriptional and social interaction deficits in amouse model of Smith–Magenis syndrome. ***PNAS,*** 115(42), 10744-10749.
11. Ye J, Tang S, Meng L, Li X, Wen X, Chen S, Niu L, Li X, Qiu W, **Hu H**, Jiang M, Shang S, Shu Q, Zheng H, Duan S, Li Y. (2018) Ultrasonic Control of Neural Activity through Activation of the Mechanosensitive Channel MscL. ***Nano Letters***, 18(7) 4148-4155.
12. Fan Z and **Hu H**. (2018) Medial Prefrontal Cortex Excitation/Inhibition Balance and Schizophrenia-like Behaviors Regulated by Thalamic Inputs to Interneurons. ***Biological Psychiatry*** 83(8):630-31 (invited Commentary)
13. Zhou TT, Sandi C\*, **Hu H**\*. (2018) [Advances in understanding neural mechanisms of social dominance.](https://www.sciencedirect.com/science/article/pii/S0959438817302891) ***Current Opinion in Neurobiology***,49 (invited review, \* co-corresponding author)
14. Yang Y, Wang H, Hu J\*, **Hu H**\*. (2018) [Lateral habenula in the pathophysiology of depression](https://www.sciencedirect.com/science/article/pii/S0959438817302908). ***Current Opinion in Neurobiology***,48(invited review, \* co-corresponding author)
15. Zhang Q, He Q, Wang J, Fu C, **Hu H**. (2017) [Use of TAI-FISH to visualize neural ensembles activated by multiple stimuli](https://www.nature.com/articles/nprot.2017.134). ***Nature Protocol****,* 13:118-33
16. Zhu H, **Hu, H**. Brain’s neural switch for social dominance in animals. ***Sci. China Life Sci*** 61, 113-114
17. **Hu H\***, Qin Y\*, [Bochorishvili](https://www.researchgate.net/researcher/14802536_Genrieta_Bochorishvili) G, Zhu Y, Van Aelst, L, and Zhu JJ. (2008) Ras signaling mechanism for impaired synaptic plasticity and AMPA receptor trafficking in a mouse model of fragile X syndrome. ***Journal of Neuroscience***, 28(31): 7847-62.) (\* co-first author)
18. **Hu H\***, Li M**\***, Labrador J, McEwen J, Lai EC, Goodman CS, Bashaw GJ. (2005) Cross GTPase-activating protein (CrossGAP)/Vilse links the Roundabout receptor to Rac to regulate midline repulsion. ***Proc Natl Acad Sci*** 102(12): 4613-8. (\* co-first author)
19. Godenschwege TA, **Hu H**, Shan X, Goodman CS and Murphey RK. (2002) Bi-directional signaling by Semaphorin 1a during central synapse formation in Drosophila. ***Nature Neuroscience*** 5: 1294-301.
20. Bashaw GJ, **Hu H**, Nobes CD, Goodman CS. (2002) A novel Dbl family RhoGEF promotes Rho-dependent axon attraction to the central nervous system midline in Drosophila and overcomes Robo repulsion***. Journal of Cell Biology***155(7): 1117-1122. (Cover article)
21. **Hu H**, Marton T and Goodman CS. (2001) PlexinB Mediates Axon Guidance in Drosophila by Simultaneously Inhibiting Active Rac and Enhancing RhoA Signaling. ***Neuron*** 32(1): 39-51. (Highlighted in the Preview of ***Neuron***)
22. Driessens MH, **Hu H**, Nobes CD, Self A, Jordens I, Goodman CS, Hall A. (2001) Plexin-B semaphorin receptors interact directly with active Rac and regulate the actin cytoskeleton by activating Rho. ***Current Biology***, 11(5): 339-44.
23. Bellocchio EE, **Hu H**, Pohorille A, Chan J, Pickel VM and Edwards RH. (1998) The Localization of the Brain-Specific Inorganic Phosphate Transporter Suggests a Specific Presynaptic Role in Glutamatergic Transmission. ***J. Neurosci.***, 18(21): 8648-59.

**Invited Talks (selected)**

2019 Society of Neuroscience, **Clinical** **Special Lecture**, Chicago, US

2019 International ION Channel Conference, **Keynote Lecture**, Hangzhou, China

2019 Asian College of Neuropsychopharmacology AsCNP meeting, **Keynote Lecture**, Fukuoka, Japan

2019 Singapore Society of Neuroscience meeting, **Keynote Lecture**

2019 International Brain Research Organization IBRO meeting **Keynote lecture,** Daegu, Korea

2019 Francis Crick Symposium of Neuroscience, Cold Spring Harbor Asia Conference, meeting

**co-organizer**, Suzhou, China

2019 Gordon Conference on Neuromodulation, Diablerets, Swizerland

2019 Netherland Institute for Neuroscience **Swammerdam Lecture**, Amsterdam, Netherlands

2019 Danish Translational Neuroscience Institute student-invited seminar, Aarhus, Denmark

2019 3rd International Brain Stimulation Conference **Plenary lecture,** Vancouver, Canada (declined

due to time conflict)

2018 Australasian Neuroscience Society **Presidential talk**, Brisbane, Australia (declined due to time

conflict)

2018 Canada **Gairdner Award Symposium** “Let there be light, Optogenetics in neuroscience and

beyond”, Toronto, Canada

2018 Stanford University Neuroscience Seminar, Palo Alto, USA

2018 NIH Neuroscience Seminar, Bethesda, USA

2018 UCLA seminar, Los Angeles, USA

2018 Scripps Institute seminar, San Diego, USA

2018 Cold Spring Harbor Asia Conference on “Latest advances in development & function of neural

circuits”, meeting **co-organizer**, Awaji, Japan

2018 Japanese Society for Neuroscience Symposium talk, **Session co-chair**, Kobe, Japan

2018 FENS meeting, symposium speaker on “Exploring an uncharted territory of the brain, the role of

habenula in animal behavior”, Berlin, Germany

2018 Gordon conference on “Molecular and Cellular Neurobiology”, Hongkong, China

2018 Cold Spring Harbor Conference on “Brains & Behavior: Order & Disorder in the Nervous

System”, New York, USA

2017 MIT Picower Symposium on “Neural Circuits of Emotion and Motivation”, Boston, USA

2017 Harvard University Center for Brain Science seminar, Boston, USA

2017 Boston Children’s Hospital Kirby Neuroscience Program seminar, USA

2017 Mount Sinai Medical School seminar, New York, USA

2017 Gordon Conference on “Excitatory Synapses & Brain Function”, Diablerets, Switzerland

2017 Francis Crick Symposium of Neuroscience, Cold Spring Harbor Asia Conference, meeting

**co-organizer**, Suzhou, China

2016 UCSD symposium “Wiring and Functional Principles of Neural Circuits”, San Diego, USA

2016 Nature Conference on “Neural Circuitry of Emotion”, Shenzhen, China

2016 Annual Conference of Chinese Psychology Society, **Plenary lecture**, Chongqing, China

2016 Chinese-American Kavli Frontiers of Science Conference, **Session organizer**, Irvine, USA

2016 Korean Society of Neuroscience symposium talk, Seoul, Korea

2016 FENS meeting, symposium organizer, Copenhagen, Denmark

2016 “The Neurobiology of Mental Health” NCCR Conference, Geneva, Switzerland

2016 NYU-Shaghai seminar

2015 Biennial Conference of Chinese Neuroscience Society, **Plenary lecture**

Wuzheng, China

2015 Francis Crick Symposium of Neuroscience, Cold Spring Harbor Asia Conference,

Suzhou, China

2015 “From Neural Circuitry to Neurotechnology” meeting by AAA Science, RIKEN & IPSEN,

Tokyo, Japan

2014 Society of Japanese Neuroscience Conference, symposium on aggression behavior, Japan

2014 RIKEN seminar, Japan

2014 Chinese-American Frontiers of Science Symposium

2014 Institute of Biophysics "Bei Shi Zhang" seminar, Chinese Academy of Sciences, Beijing

2013 FMI seminar, Basel, Switzerland

2013 EMBL seminar, Monterotondo, Italy

2013 Cold Spring Harbor Asia Conference, Francis Crick Symposium of Neuroscience:

The Changing Brain. Suzhou, China

2013 CGSB Meeting of NYU, Abu Dhabi, UAE

2012 College de France, Paris, France

2012 University of Muenster/EMBL, Muenster, Germany

2012 The European Science Foundation/FENS conference on The Neurobiology of Emotion,

Stressa, Italy.

2012 14th International Congress of Histochemistry and Cytochemistry (ICHC 2012). Kyoto, Japan.

（**Session co-chair** on “Neurobiology of social behavior”）

2012 Cold Spring Harbor Asia Conference on Neural Circuit Basis of Behavior and its Disorders.

Suzhou, China.

2011 Erasmus University, Department of Neuroscience seminar, the Netherlands.

2011 VU University of Amsterdam seminar, the Netherlands.

2011 4th Sino-German Frontiers of Science Symposium in Berlin

2010 Japan National Institute for Physiological Science meeting “Synapse”

2009 22nd Biennial Meeting of International Society of Neurochemistry, Young Scientist

Lecture, “In search of the Molecular and Circuit Mechanism of Depression”

2008 New York University, Center for Neural Science

2008 Mount Sinai Medical School

2008 Harvard University, Center for Brain Science

2008 MIT, Picower Center for Learning and Memory