Curriculum Vitae, May 2024

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Giulio Tononi received his medical degree and specialized in Psychiatry at the University of Pisa, Italy. After serving as a medical officer in the Army, he obtained a Ph.D. in neuroscience as a fellow of the Scuola Superiore, based on his work on sleep regulation. From 1990 to 2000, he has been at The Neurosciences Institute, first in New York and then in San Diego. He is currently Professor of Psychiatry, Distinguished Professor in Consciousness Science, the David P. White Chair in Sleep Medicine at the University of Wisconsin-Madison, and the Director of the Wisconsin Institute for Sleep and Consciousness. In 2005 he received the NIH Director's Pioneer Award for his work on sleep. His laboratory studies the mechanisms and functions of sleep as well as consciousness and its disorders.

Dr. Tononi's main contribution in the study of sleep has been the development of a comprehensive hypothesis about the function of sleep, the *synaptic homeostasis hypothesis*. According to the hypothesis, sleep serves to renormalize synaptic strength, counterbalancing a net increase of synaptic strength due to plasticity during wakefulness. Without sleep, such

progressive increase in synaptic strength would lead to unsustainable costs in terms of energy, space, cellular supplies, and would saturate the ability to learn. In short, sleep is the price to pay for plasticity during wakefulness.

On the basis of the synaptic homeostasis hypothesis, Dr. Tononi and his long-term collaborator Chiara Cirelli have shown, using a combination of genetic, molecular, and electrophysiological approaches: (1) that there are striking differences in the expression of certain genes between sleep and waking in most of the brain; (2) specific neuromodulators are responsible for molecular changes that limit the acquisition of new information to waking and not sleep; (3) synaptic strength does in fact increase during wake and decrease during sleep in much of the brain, as shown using molecular and electrophysiological markers in both invertebrates, rodents, and humans; (4) in invertebrates even the number of synapses increases during wake and decreases during sleep; (5) sleep need is increased by the amount of plastic changes during wake; (6) sleep can be induced on a local basis by learning and plasticity; (7) sleep slow waves are important for brain restoration and performance enhancements.

In related work, Dr. Tononi and collaborators have shown that: (8) based on a variety of behavioral, pharmacological, and molecular criteria, sleep-like states are present in the fruit fly *Drosophila*. This finding, which has been followed by the demonstration by other laboratories of sleep-like states in other invertebrates, has demonstrated that sleep is a universal state and presumably serves a universal function. This finding also opened the way to (9) the genetic dissection of sleep using mutant screening, including the discovery of the first extreme sleep mutant (minisleep). Additional work in the Tononi-Cirelli lab has discovered (10) local sleep in wake: small populations of neurons can enter a sleep mode (go briefly off-line) even during full wakefulness, leading to fluctuating cognitive impairments that increase with the duration of wakefulness. This finding provides a plausible account of the deficits observed with sleep deprivation and restriction; (11) local sleep in sleep: while some brain regions go briefly off-line, other regions often remain on-line even during full sleep. As shown by further studies in humans, the findings about the mechanisms and functions of sleep has implications (12) for sleep disorders, such as parasomnias, for the neurobiology of mood disorders, and for the beneficial effects of sleep deprivation on depression. Finally, Dr. Tononi's laboratory has demonstrated that (13) patients with schizophrenia show a characteristic reduction of sleep spindles – a hallmark of the sleep EEG - pointing to an impairment of a specific region of the thalamus that could account for many of the symptoms.

Dr. Tononi's main contribution in the study of consciousness has been the development of the *integrated information theory (IIT)*. This is a comprehensive theory of what consciousness is, what determines its quantity and quality, and how it emerges from causal structures such as neural networks. The theory provides a parsimonious account of many neuropsychological observations, among them why certain parts of the brain are associated with experience and others are not, why consciousness vanishes during slow wave sleep and seizures despite continuing neural activity, and how unconscious processes interact with conscious ones. The

theory has implications for the unfolding of consciousness across development and phylogeny, and predicts which ingredients are necessary and sufficient to construct sentient machines.

On the basis of IIT, Dr. Tononi and collaborators have: (1) developed theoretical approaches aimed at defining and measuring the quantity and quality of information integration; (2) constructed large-scale computer models based on the anatomy and physiology of the thalamocortical system to study the mechanisms of information integration; (3) addressed the problem of how the activities of functionally specialized areas of the brain can be integrated to give rise to a unified conscious experience; (4) pioneered experimental approaches aimed at characterizing the neural substrate of conscious experience by using neuroimaging and transcranial magnetic stimulation. In several recent experiments, Dr. Tononi and collaborators have shown that the loss of consciousness during slow waves sleep, general anesthesia, and in vegetative patients is associated with a breakdown of information integration, as predicted by the theory. These approaches may provide an objective marker to evaluate the presence of consciousness and guide rehabilitation and treatment in non-communicating patients.
Dr. Tononi is a frequent lecturer and invited speaker at scientific symposia. He is the author of >300 scientific peer-reviewed publications, co-editor of the volume *Selectionism and the Brain* (with Olaf Sporns), and author of two books on the neural basis of consciousness: *A Universe of Consciousness* (with Gerald M. Edelman) and *Galileo and the Photodiode*. Prof. Tononi's latest book, *Sizing up Consciousness* (co-authored with Prof. Marcello Massimini), was published in 2018.

Dr. Tononi is a frequent lecturer and invited speaker at scientific symposia. He is the author of ~500 scientific peer-reviewed publications, co-editor of the volume *Selectionism and the Brain* (with Olaf Sporns), and author of two recent books on the neural basis of consciousness: *A Universe of Consciousness* (with Gerald M. Edelman) and *Galileo and the Photodiode*. His latest book on consciousness, entitled: *PHI: A voyage from the brain to the soul*, was published in August 2012.

BACKGROUND INFORMATION

Name: Giulio Tononi

Education:

Degrees

1979-1985	M.D., Scuola Superiore S.Anna and University of Pisa, Italy
1985-1989	Ph.D. in Neuroscience, Scuola Superiore S.Anna and University of Pisa, Italy
1985-1989	Residency in Psychiatry, University of Pisa, Italy
1987	Fellowship in sleep research, University of Lyon, France

Certifications

1985	Certification in General Medicine, University of Pisa, Italy
1989.	Certification in Psychiatry, University of Pisa, Italy

Positions Held:

1988-1989	Medical Officer, Italian Army, Military Center for Applied Research, S.Piero a Grado, Pisa
1990-1993	Fellow in Theoretical Neuroscience, The Neurosciences Institute, New York
1992-1998	Assistant Professor, Scuola Superiore S.Anna and University of Pisa, Italy
1993-1999	Senior Fellow in Theoretical and Experimental Neuroscience, The Neurosciences Institute, San Diego
1998-2001	Associate Professor, University of Pisa Medical School, Italy
1999-2000	Joint appointment as Associate Professor, The Scripps Research Institute, San Diego
1999-2000	Institute Chair in Theoretical and Experimental Neuroscience, The Neurosciences Institute, San Diego
2001-	Professor of Psychiatry, University of Wisconsin, Madison
2016-	Chair of the Neuroscience School of Advanced Studies' Biennial Summer School on Consciousness
2016-	Director of the Wisconsin Institute for Sleep and Consciousness

Honors and Awards:

1978.	Bachelor Degree cum Laude, Trento, Italy
1979-1985	Winner of the prestigious and only Italian M.D. fellowship competition (national sponsorship, 2-3 positions/year), Scuola Superiore, Pisa
1985	M.D. with Honors
1985-1989	Winner of the prestigious and only national Ph.D. fellowship competition (national sponsorship, 2 positions/year), Scuola Superiore, Pisa
1989	Ph.D. with Honors
1990-1993	Fellowship in theoretical neuroscience at The Neurosciences Institute, New York
1993	Best Young Italian Scientist Award
2001	Distinguished Psychiatrist Frontier of Science Award, American Psychiatric Association
2003	Pfizer Award in Sleep Science
2004	Distinguished Investigator Award, National Alliance for Research on Schizophrenia and Depression
2004	Visiting Professor, Ecole Normale Superieure, Paris, France
2005	NIH Director's Pioneer Award
2006	Honorary Doctoral Degree, University of Zurich, Switzerland
2006	Pisa Sleep Award, European Sleep Research Society
2006	Distinguished Professor of Consciousness Science
2008	David P. White Chair in Sleep Medicine
2011	American Society of Anesthesiologists: John W. Severinghaus Award
2017	Honorary Doctoral Degree, Universidad Nacional de San Martin
2017	Peter C. Farrell Prize in Sleep Medicine for outstanding lifetime contributions to the field of sleep, Harvard Medical School
2017	Italian Society for Neuroethics' SINe Medal, University of Padova, Italy
2017	The Gertrude Reemtsma Foundation's International Prize for Translational Neuroscience, Max Planck Institute
2018	Bernese Sleep Award, Academy of Sleep & Consciousness, University of Bern & University of Lugano

2018	Humboldt Research Award, Humboldt Foundation, Germany
2018	Leibniz Chair, Leibniz Institute for Neurobiology, Magdeburg, Germany

Society Memberships and Editorial Boards:

1992 -	Society for Neuroscience
1998 -	Association for the Scientific Study of Consciousness
1999 -	American Sleep Research Society
1993 -	Editorial Board of Archives Italiennes de Biologie
1999 -	Editorial Board of Consciousness and Cognition

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Books:

1. Massimini M, Tononi G (2018) Sizing Up Consciousness: Towards an Objective Measure of the Capacity for Experience. Oxford University Press.

2. Tononi G (2012) *PHI: A Voyage from the Brain to the Soul*. Pantheon Books.

3. Laureys S, Tononi G (2009) *The Neurology of Consciousness: Cognitive Neuroscience and Neuropathology*. Academic Press.

4. Tononi G (2003) *Galileo e il fotodiodo*. Laterza, Bari (translated into French, German, and Spanish).

5. Edelman GM, Tononi G (2000) *A Universe of Consciousness: How Matter Becomes Imagination*. Basic Books (translated into German, French, Spanish, Italian, and Chinese).

6. Sporns O, Tononi G (1994) *Selectionism and the Brain*. Academic Press.

Peer-reviewed papers:

1. Tononi G, Raison C (2024) AI, consciousness, and psychiatry. World Psychiatry in press.

2. Mao R, Cavelli ML, Findlay G, Driessen K, Peterson MJ, William Marshall, Tononi G, Cirelli C (2024) Behavioral and cortical arousal from sleep, muscimol-induced coma, and anesthesia by direct optogenetic stimulation of cortical neurons. iScience in press.

3. Tononi G, Boly M, Cirelli C (2024) Consciousness and sleep. Neuron, 112. doi: 10.1016/j.neuron.2024.04.011

4. Cirelli C, Tononi G (2024) The many unknowns of partial sensory disconnection during sleep: a review of the literature. Clinical and Translational Neuroscience, *8*(1), 9. doi: 10.3390/ctn8010009

5. Rigoni I, Vorderwülbecke BJ, Carboni M, Roehri N, Spinelli L, Tononi G, Seeck M, Perogamvros L, Vulliemoz S (2024) Network alterations in temporal lobe epilepsy during non-rapid eye movement sleep and wakefulness. Clinical Neurophysiology 159, 56-65.

6. Albantakis L, Barbosa L, Findlay G, Grasso M, Haun AM, Marshall W, Mayner WGP, Zaeemzadeh A, Boly M, Juel BE, Sasai S, Fujii K, David I, Hendren J, Lang JP, Tononi G (2023) Integrated information theory (IIT) 4.0: Formulating the properties of phenomenal existence in physical terms. PLoS Comput Biol. 19(10):e1011465.

7. Cavelli ML, Mao R, Findlay G, Driessen K, Bugnon T, Tononi G, Cirelli C (2023) Sleep/wake changes in perturbational complexity in rats and mice. iScience, 26(3): 106186. doi: 10.1016/j.isci.2023.106186.

8. Marshall W, Grasso M, Mayner WGP, Zaeemzadeh A, Barbosa LS, Chastain E, Findlay G, Sasai S, Albantakis L, Tononi G (2023) System Integrated Information. Entropy, 25(2): 334. doi: 10.3390/e25020334

9. Melloni L, Mudrik L, Pitts M, Bendtz K, Ferrante O, Gorska U, Hirschhorn R, Khalaf A, Kozma C, Lepauvre A, Liu L, Mazumder D, Richter D, Zhou H, Blumenfeld H, Boly M, Chalmers DJ, Devore S, Fallon F, de Lange FP, Jensen O, Kreiman G, Luo H, Panagiotaropoulos TI, Dehaene S, Koch C, Tononi G

(2023) An adversarial collaboration protocol for testing contrasting predictions of global neuronal workspace and integrated information theory. PLoS One, 18(2): e0268577.

10. Castelnovo A, Lividini A, Riedner BA, Avvenuti G, Jones SG, Miano S, Tononi G, Manconi M, Bernardi G (2023) Origin, synchronization, and propagation of sleep slow waves in children. Neuroimage 274:120133.

11. Ort A, Smallridge JV, Sarasso S, Casarotto S, von Rotz R, Casanova A, Seifritz E, Preller KH, Tononi G Vollenweider FX (2023) TMS-EEG and resting-state EEG applied to altered states of consciousness: oscillations, complexity, and phenomenology. iScience 26:106589

12. Brian L Edlow BL, Fecchio M, Bodien YG, Comanducci A, Rosanova M, Casarotto S, Young MJ, Li J, Dougherty DD, Koch C, Tononi G, Massimini M, Boly M (2023) Measuring Consciousness in the Intensive Care Unit. Neurocrit Care 38(3):584-590.

13. Gandhi SR, Mayner WGP, Marshall W, Billeh YN, Bennett C, Gale SD, Mochizuki C, Siegle JH, Olsen S, Tononi G, Koch C, Arkhipov A (2023) A survey of neurophysiological differentiation across mouse visual brain areas and timescales. Frontiers in Computational Neuroscience 17, 1040629

14. Loschky SS, Spano GM, Marshall W, Schroeder A, Nemec KM, Schiereck SS, de Vivo L, Bellesi M, Banningh SW, Tononi G, Cirelli C (2022) Ultrastructural effects of sleep and wake on the parallel fiber synapses of the cerebellum. eLife, 11: e84199. doi: 10.7554 /eLife.84199

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    Sarasso S, D'Agnostino A (2020) Slow wave oscillations in Schizophrenia First-Degree Relatives: A confirmatory analysis and feasibility study on slow wave traveling. Schizophr Res. 221: 37-43. doi: 10.1016/j.schres.2020.03.025

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Selected Book Chapters:

1. Tononi G (2017) The Integrated Information Theory of Consciousness: An Outline. In Schneider S & Velmans M (Eds.) *The Blackwell Companion to Consciousness*, pp. 243-256: John Wiley & Sons Ltd.

2. Tononi G (2017) Integrated Information Theory of Consciousness: Some Ontological Considerations. In Schenider S & Velmans M (Eds.) *The Blackwell Companion to Consciousness*, pp. 621-633: John Wiley & Sons Ltd.

3. Albantakis L, Tononi G (2017) Automata and Animats: From Dynamics to Cause-Effect Structures. In Walker S, Davies P, & Ellis G (Eds.), *From Matter to Life: Information and Causality*, pp. 334-365: Cambridge University Press.

4. Tononi G & Cirelli C (2016). Sleep and Synaptic Down-Selection. In Buzsáki G & Christen C (Eds.) *Micro-, Meso- and Macro-Dynamics of the Brain*, pp. 99-106: Springer.

5. Tononi G, Boly M, Gosseries O, & Laureys S (2015) The Neurology of Consciousness, An Overview. In Laureys S, Gosseries O, & Tononi G (Eds.), *The Neurology of Consciousness: Cognitive Neuroscience and Neuropathology, 2nd Edition*, pp. 407-461: Academic Press, Elsevier.

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10. Tononi G. The Neurobiology of Sleep. In Buxbaum J, Charney D, Nestler E & Sklar P (Eds.) *Neurobiology of Mental Illness, 4th Edition*, pp.1127-1143: Oxford University Press.

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35. Tononi G (2004) Consciousness and the brain: Theoretical aspects. In Adelman G & Smith BH (Eds.) *Encyclopedia of Neuroscience, 3rd Edition*, pp. 1-16: Elsevier, New York.

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43. Pompeiano M, Cirelli C, Tononi G (1998) Reverse transcription mRNA differential display: a systematic molecular approach to identify changes in gene expression across the sleep-waking states. In Lydic R (Ed.) *Molecular Regulation of Conscious States*, pp. 157-165: CRC Press.

44. Edelman GM, Tononi G (1997) Neural Darwinism: A selectionist view of the brain. In Meier H & Ploog D (Eds.) *Der Mensch und sein Gehirn.,* pp. 187-234: Piper Verlag Press, Muenchen.

45. Edelman GM, Tononi G (1996) Selection and development: The brain as a complex system. In Magnusson G (Ed.) *Lifespan Development of Individuals*, pp. 179-204: Cambridge University Press, Cambridge.

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47. Edelman GM, Tononi G (1995) Neural Darwinism: the brain as a selectional system. In Cornwell J (Ed.) *Nature's Imagination*, pp. 78-100: Oxford University Press.

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49. Sporns O, Tononi G, Edelman GM (1994) Neural models of cortical integration. In Thatcher RW, Hallett M, Zeffiro T, John ER, Huerta M (Eds.) *Functional Neuroimaging: Technical Foundations*, pp. 1-7: Academic Press.

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51. Reeke GN Jr, Sporns O, Gall WE, Tononi G, Edelman GM (1993) A biologically based synthetic nervous system for a real-world device. In Mammone RJ (Ed.) *Neural Networks for Speech and Vision*, pp. 457-473: Chapman & Hall.

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53. Tononi G, Sporns O, Edelman GM (1992) The problem of neural integration: induced rhythms and short-term correlations. In Basar E & Bullock T (Eds.) *Induced rhythms in the brain*, pp. 367-395: Birkhäuser, Boston, MA.

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Abstracts: not listed

Book reviews:

Tononi G (2005) Review of *Neuronal Substrates of Sleep and Epilepsy*, by Steriade M: Cambridge University Press, Cambridge, 2003. Neuroscience, 4(132): 1199.

Tononi G (1994) Review of *Nature's Mind: The Biological Roots of Thinking, Emotions, Sexuality, Language, and Intelligence* by Gazzaniga MS: Basic Books, 1992. American Scientist, 82:289.

Tononi G (1992) Review of *Wet Mind: The New Cognitive Neuroscience*, by Kosslyn SM and Koenig O: Free Press, 1992. Trends in Neurosciences, 15:409-410.

Tononi G (1991) Review of *Brainstem control of wakefulness and sleep*, by Steriade M and McCarley RM: Plenum Press, New York, 1990. Arch. Ital. Biol., 129:295-296.

Lectureships:

1. Invited speaker, 2024, June 30: "Structural approaches to consciousness: Qualia Structure and Integrated Information Theory", Association for the Scientific Study of Consciousness ASSC27, Tokyo, Japan.
2. Invited speaker, 2024, June 20: "Integrated Information Theory 4.0", Qualia Structure Summer School, Osaka/Kobe, Japan.
3. Invited speaker, 2024, May 16: "TNC Neurocolloqium", Max Plank Institute, Tubingen, Germany.
4. Faculty speaker, 2024, May 4: "Sleep and Restorative Processes". Neuroscience School of Advanced Studies Course. Venice, Italy.
5. Invited speaker, 2024, April 22: "The Science of Consciousness TSC2024", Tucson, AZ.
6. Invited speaker, 2023, September 29: "Neural correlates of pure presence". TBD Meeting, Santa Monica, CA.
7. Invited magisterial speaker, 2023, September 19: "Consciosuness and the Brain". U of Messina, Italy
8. Faculty speaker, 2023, September 8: "Integrated Information Theory". Neuroscience School of Advanced Studies Summer Course "Integrated Information Theory". Venice, Italy
9. Lecture speaker: "The future of consciousness research". The Neuroscience Summit, Crans-Montana, Switzerland, Sept 6, 2023.
10. Lecture speaker, 2023, August 24. Bethesda, Darpa Wisconsin Strengthen Project project.
11. Lecture speaker, 2023, August 22: "Measuring consciousness in the I.C.U." Vail Scientific Summit, Vail, CO.
12. Public Lecture speaker, 2023, August 21: "Consciousness and our place in nature". Vail Scientific Summit, Vail, CO.
13. Lecture speaker: "Consciousness and Integrated Information". NIH workshop on "Next frontiers in consciousness research". Bethesda, June 26, 2023.

14. Invited Speaker, 2022, December 2: "Brain States and Consciousness." International School of Brain Cells & Circuits' 2022 course *Modeling the Brain*. Ettore Majorana Foundation and Centre for Scientific Culture. Erice, Italy.
15. Invited Speaker, 2022, November 26: "Consciousness: a journey from the mind to the brain." The 2022 Festival Delle Scienze Roma. Rome, Italy.
16. Invited Speaker, 2022, October 21: "Consciousness and Ontology." Technology that changes our life: Part II of the virtual studio *Homo Roboticus: How do we prepare for the future*. MasterClassLeadership.org, Online.
17. Invited Speaker, 2022, September 23: "IIT 4.0: From phenomenology to physics". The Elkana Forum – The Future of Science: Disciplines in Disarray. Session: The Limits of Consciousness. Max Planck Institute, Berlin, Germany.
18. Keynote speaker, 2022, September 7: "IIT 4.0: From phenomenology to physics". Models of Consciousness 2022: A conference on mathematical approaches in the scientific study of consciousness. Frances C. Arrillaga Alumni Center, Stanford University, California.
19. Faculty speaker, 2022, May 12: "An introduction to the integrated information theory". Neuroscience School of Advanced Studies Summer Course "Consciousness: From Theory to Practice". Venice, Italy.
20. Invited Speaker, 2022, April 21: "Consciousness and life." Lecture for undergraduate course '*What is life?*' University of Wisconsin – Madison, Wisconsin.
21. Invited Speaker, 2021, September 18: "A neuroscience perspective on consciousness". *Mind and Matter – the Kankas Symposium*, sponsored by the Emmy Network and the Universities of Turku and Helsinki. Turku, Finland.
22. Invited Lecturer, 2021, September 16: "Workshop on Integrated Information Theory (full day)". University of Helsinki, Helsinki, Finland.
23. Invited Lecturer, 2021, June 25: "Integrated information theory and its implications for freewill." 2nd Meeting of the Neurophilosophy of Freewill Consortium, (online).
24. Invited Lecturer, 2021, June 22: "Consciousness as a cause-effect structure." Lecture for International Max Planck Research School (IMPRS), Gottingen, Germany (online).
25. Invited Lecturer, 2021, May 26: "Consciousness as a cause-effect structure." Rolf Kotter Lecture for the 2021 Brain Connectivity Workshop, Toronto, Canada (online).
26. Invited Lecturer, 2021, April 7: "Consciousness: From theory to practice." Geschwind Grand Rounds Lecture, Harvard Medical School, Cambridge, MA (online).
27. Invited Lecturer, 2021, February 9: "Consciousness and our place in Nature: Part II." For Neuroscience and Psychology course 'Consciousness,' California Institute of Technology, Pasadena, CA (online).
28. Invited Lecturer, 2021, February 4: "Consciousness and our place in Nature: Part I." For Neuroscience and Psychology course 'Consciousness,' California Institute of Technology, Pasadena, CA (online).
29. Invited Panelist, 2021, February 3: "Consciousness and AI: A roundtable discussion." UMANIA 2021 Conference, IULM University, Milan, Italy (online).
30. Invited Speaker, 2021, February 3: "Consciousness: Natural and artificial?" UMANIA 2021 Conference, IULM University, Milan, Italy (online).
31. Invited Speaker, 2020, November 13: "Consciousness and our place in nature." Lecture for Fondazione Prada's 'Human Brains: Culture and Consciousness' online conference. Lecture at: www.youtube.com/watch?v=joqY2T4GWHg&feature=youtu.be
32. Invited Speaker, 2020, September 9: "Adversarial perspective – Reflections from IIT." 2nd TWCF Workshop on Consciousness (online).
33. Plenary Speaker, 2020, July 31: "Consciousness: From theory to practice." 43rd Annual Meeting of the Japan Neuroscience Society (online).

34. Invited Speaker, 2020, June 4: "3.5 hr Q&A on Integrate Information Theory." Department of Psychology lecture series, Monash University, Melbourne, Australia.
35. Invited Speaker, 2020, May 12: "IIT: From theory to practice – Part II." California Institute of Technology, Pasadena, California California.
36. Invited Speaker, 2020, May 7: "IIT: From theory to practice – Part I." California Institute of Technology, Pasadena, California.
37. Invited Speaker, 2020, April 7: "An introduction to the science of consciousness." Lecture for undergraduate course '*What is life?*' University of Wisconsin – Madison, Wisconsin.
38. Invited Speaker, 2020, March 6: "Consciousness and the brain." Neuroscience Grand Rounds, University of Alberta, Canada.
39. Keynote Speaker, 2020, March 5: "Consciousness." Neuroscience and Mental Health Institute Research Day. Bernard Snell Hall, University of Alberta, Canada.
40. Invited Speaker, 2020, March 3: "Consciousness: From Theory to Practice." Harley Hotchkiss Memorial Lecture. University of Lethbridge, Lethbridge, Canada.
41. Invited Speaker, 2020, March 2: "Consciousness and our place in nature." Public Lecture at BMO Auditorium, University of Lethbridge, Lethbridge, Canada.
42. Invited Speaker, 2019, September 18: "Sleep and synaptic down-selection". Mystery of the Brain: Symposium in honor of Prof. Nikos K Logothetis, Tuebingen, Germany.
43. Invited Speaker, 2019, July 1: "Workshop on Integrated Information Theory". Leibniz Institute for Neurobiology, Magdeburg, Germany.
44. Invited Speaker, 2019, June 22: "Integrated Information Theory: A principled approach to what consciousness is and what it takes to have it". Workshop given at Complutense University, Madrid, Spain.
45. Invited Speaker, 2019, June 21: "Consciousness and our place in nature". Neuroscience of Mindfulness conference. Complutense University, Madrid, Spain.
46. Invited Faculty Speaker, 2019, May 17: "Sleep and Dreaming". Neuroscience School of Advanced Studies Summer Course "Sleep and Circadian Rhythms". San Servolo, Venice, Italy.
47. Invited Speaker, 2019, May 16: "Workshop on Integrated Information Theory". Scuola Internazionale Superiore di Studi Avanzati (SISSA), Trieste, Italy.
48. Invited Speaker, 2019, May 15: "Consciousness and our place in nature". Scuola Internazionale Superiore di Studi Avanzati (SISSA) Colloquium series. SISSA, Trieste, Italy.
49. Invited Speaker, 2019, May 14: "Tutorial Workshop on Integrated Information Theory: Part II". Universität Bonn, Bonn, Germany.
50. Invited Speaker, 2019, May 13: "Tutorial Workshop on Integrated Information Theory: Part I". Universität Bonn, Bonn, Germany.
51. Invited Speaker, 2019, May 10: "Consciousness and its place in nature". 10th Ernst Robert Curtius Lecture. Universität Bonn, Bonn, Germany.
52. Invited Speaker, 2019, April 1: "What is consciousness?". 23rd Annual Swartz Foundation Mind Brain Lecture. Stonybrook University, New York.
53. Plenary Speaker, 2019, March 20: "Consciousness: From theory to practice". Klaus Joachim Zülch Lecture at the 13th Göttingen Meeting of the German Neuroscience Society. Göttingen, Germany.
54. Invited Speaker, 2019, February 3: "Ultrastructural evidence for synaptic changes between wake and sleep". Meeting of the Sleep Research Society - Advances in Sleep and Circadian Science. Clearwater Beach, Florida.
55. Keynote Speaker, 2019, January 17: "What is consciousness? Time, Consciousness and Reality". 2019 KAUST Winter Enrichment Program (WEP). King Abdullah University of Science and Technology, Jeddah, Saudi Arabia.

56. Invited Speaker, 2018, December 14: “Two consequences of integrated information theory”. Max-Planck-Institute’s Symposium on Consciousness: Nature/Culture. Max Planck Institute, Berlin, Germany.
57. Invited Speaker, 2018, December 13: “Leibniz Mühle: The problem of consciousness”. Leibniz Chair Inauguration Lecture. Leibniz Institute for Neurobiology, Magdeburg, Germany.
58. Invited Speaker, 2018, December 11: “Sleep: A Window on Consciousness”. Center for Neural Circuits and Behavior Seminar series, University of Oxford, UK.
59. Invited Speaker, 2018, October 18: “Sleep as a Window on Consciousness”. Berner Schlaf-Wach (Bernese Sleep-Awake) Symposium, Berner Schlaf-Wach-Tage Conference. Inselspital, Bern, Switzerland
60. Keynote Speaker, 2018, October 17: “The burden of wake and the reasons of sleep”. Decoding Sleep: From Neurons to Health & Mind Symposium, Berner Schlaf-Wach-Tage (Bernese Sleep Awake Days) Conference. Inselspital, Bern, Switzerland.
61. Invited Speaker, 2018, October 11: “The burden of wake and the reasons of sleep”. Memory School 2018, CorBi Foundation and Humanities and Health Sciences Institute of the Ortega-Marañon Foudnation, Toledo, Spain.
62. Invited Speaker, 2018, October 8: “Sleep: A Window on Consciousness”. Lecture series: Westend Lectures on Brain and Cognition, Max-Planck-Institute for Empirical Aesthetics, Frankfurt, Germany.
63. Faculty speaker, 2018, July 1: “Integrated Information Theory”. Neuroscience School of Advanced Studies Summer Course “Consciousness: From Theory to Practice”. Venice, Italy.
64. Invited Speaker, 2018, June 4: “The science of Slow Wave Sleep”. SLEEP 2018: APSS Annual Meeting. Baltimore, Maryland.
65. Invited Speaker, 2018, May 6: “Consciousness: a journey from the mind to the brain”. The 4th Festival della Scienza Medica. University of Bologna, Bologna, Italy.
66. Invited Speaker, 2018, April 19: “The burden of wake and the reasons of sleep”. The Swammerdam Lecture. University of Amsterdam, Amsterdam, Netherlands.
67. Invited speaker, 2018, April 18: “Sleep and synaptic plasticity”. Friedrich Miescher Institute seminar series. University of Basel, Basel, Switzerland.
68. Invited Speaker, 2018, April 17: “The burden of wake and the reasons of sleep”. Wyss Center Brain and Cognition Seminar series. Campus Biotech, University of Geneva, Switzerland.
69. Invited Speaker, 2018, January 20: “Consciousness: From Theory to Practice”. The 2018 Future Congress. Salón de Honor - National Congress, Santiago, Chile.
70. Invited speaker, 2018, January 18: “Consciousness and the Integrated Information Theory”. The 2018 Future Congress. Valparaíso, Chile.
71. Invited Speaker (w/ Prof. Chiara Cirelli), 2017, October 30: “The costs of wake and the reasons of sleep”. Peter C. Farrell Prize Lecture. Harvard Medical School, Cambridge, MA.
72. Invited Speaker, 2017, October 5: “The Integrated Information Theory of Consciousness: Explanations, Predictions & Extrapolations”. Mind Science Foundation conference “Plugged In: Emerging Technologies & the Future of Being Human”. San Antonio, Texas.
73. Invited Speaker, 2017, September 22: “Consciousness: Natural and Artificial”. DeepMind and the Science & Human Dimension Project - Conference on Memory and Imagination in Humans and Machines. Jesus College, Cambridge University, UK.
74. Invited Speaker, 2017, September 8: “The burden of wake and the reasons of sleep”. K.J. Zülch Prize lecture. Max Planck Institute, Cologne, Germany.
75. Keynote Speaker, 2017, September 6: “Sleep and synaptic down-selection”. 68th National Congress of the Italian Physiological Society. University of Pavia, Pavia, Italy.
76. Invited Faculty Speaker, 2017, July 10: “Sleep and Dreaming”. Neuroscience School of Advanced Studies Summer Course “Sleep and Cognition”. Bologna, Italy.

77. Invited Speaker, 2017, June 16: “Integrated Information theory: from Consciousness to its Physical Substrate”. Stanford Research Institute 2017 Technology and Consciousness Workshop. Menlo Park, California.
78. Keynote Speaker, 2017, May 19: “Consciousness: From Phenomenology to Physics”. IX Edition of the International Scientific Conference on Neuroethics. Padova University, Padova, Italy. Awarded with the SINe Medal (Italian Society for Neuroethics).
79. Invited Speaker, 2017, May 18: “Consciousness: from theory to practice”. Department of Information Engineering’s Distinguished Lecturer series. Padova University, Padova, Italy.
80. Invited Speaker, 2017, May 16: “Sleep and consciousness”. Neuroscience Department, Milan University, Milano, Italy.
81. Invited speaker, 2017, April 8: “Consciousness everywhere”. 2017 Festival Puerto de Ideas. Antofagasta Municipal Theater, Antofagasta, Chile.
82. Invited speaker, 2017, April 5: “Conscience and fiction”. Universidad Nacional de San Martin. Cultural Center of Science, Buenos Aires, Argentina.
83. Invited speaker, 2017, April 4: “Consciousness and our place in nature”. Lectura Mundi program lecture, Universidad Nacional de San Martin. Teatro Tornavia, Buenos Aires, Argentina. Laurea honoris causa for the work on consciousness.
84. Invited speaker, 2017, April 3: “Consciousness: From Theory to Practice”. Universidad Nacional de San Martin. Campus Miguelete, Buenos Aires, Argentina.
85. Invited speaker, 2017, February 14: “Consciousness: From Theory to Practice”. Neurology Grand Rounds lecture, University of Wisconsin-Madison, Madison, Wisconsin.
86. Invited speaker, 2016, November 16: “Consciousness and Artificial Intelligence”. 26th KAST International Symposium “Brain and Artificial Intelligence”. The Korean Academy of Science and Technology (KAST), Seoul, South Korea.
87. Invited speaker, 2016, November 10: “Sleep and Synaptic Homeostasis”. Inaugural Kupfer Lecture on Sleep Research Day. University of Pittsburgh, Pittsburgh, Pennsylvania.
88. Invited speaker, 2016, October 14: “Consciousness: From Theory to Practice”. 2016 Feature talk at the International Conference on Brain Informatics and Health. University of Nebraska, Omaha, Nebraska.
89. Invited speaker, 2016, October 7: “Sleep and Synaptic Down-Selection”. 21st James M. Orten Memorial Lecture. Wayne State University, Detroit, Michigan.
90. Faculty speaker, 2016, September 18: “Integrated Information Theory”. Neuroscience School of Advanced Studies Summer Course “Consciousness: From Theory to Practice”. Bressanone, Italy.
91. Invited speaker, 2016, August 21: “Consciousness as Integrated Information”. Foundational Questions Institute’s 5th International Conference. Banff, Canada.
92. Invited speaker, 2016, July 28: “Investigating consciousness from first principles”. Gordon Research Conference on Neurobiology of Cognition. Newry, ME.
93. Invited speaker, 2016, July 11: “The reasons of sleep and the burden of wake”. Neuroscience Seminar Series. Institut Pasteur, Paris, France.
94. Invited speaker, 2016, July 8: “A Tutorial on IIT”. Science of the Brain and Cognition conference series. Aix-Marseille University, Marseilles, France.
95. Invited speaker, 2016, July 8: “Consciousness: From theory to practice”. Science of the Brain and Cognition conference series. Aix-Marseille University, Marseilles, France.
96. Plenary speaker, 2016, July 6: “Sleep and Synaptic Down Selection”. Federation of European Neuroscience Societies (FENS) Forum of Neuroscience X. Copenhagen, Denmark.
97. Invited speaker (w/Christof Koch), 2016, June 11: “Consciousness and its place in Nature”. PHIfest: A Symposium on Integrated Information Theory. University of Wisconsin-Madison, Madison, WI.
98. Invited speaker, 2016, June 11: “IIT: Explanations, Predictions and Extrapolations”. PHIfest: A Symposium

on Integrated Information Theory. University of Wisconsin-Madison, Madison, WI.

99. Invited speaker, 2016, June 11: "IIT: Axioms and Postulates". PHIfest: A Symposium on Integrated Information Theory. University of Wisconsin-Madison, Madison, WI.

100. Invited speaker, 2016, April 28: "Consciousness: From theory to practice". Department of Neuroscience Student Invited Seminar Series. University of California-Berkeley, Berkeley, CA.

101. Invited speaker (w/ Larissa Albantakis), 2016, March 22: "Conscious and Unconscious Networks". Power of Information Workshop. Arizona State University, Tempe, AZ.

102. Invited chair, 2016, March 17: "Sleep as a Window to Study Consciousness". Gordon Research Conference on Sleep Regulation and Function. Galveston, TX.

103. Invited speaker, 2015, November 13: "Integrated Information Theory of Consciousness: An Ontological Perspective". Conference on Philosophical Foundations of Integrated Information Theory. New York University, New York, NY.

104. Invited speaker, 2015, May 20: "The integrated information theory of consciousness". Newark CMBN seminar series. Rutgers University, Newark, NJ.

105. Invited speaker, 2015, April 21: "The integrated information theory of consciousness". Albert Einstein College of Medicine Translational Speaker Series. New York, NY.

106. Invited Speaker, 2015, April 13: "Sleep and synaptic homeostasis". Foundation Ipsen Symposium on 'Micro-, meso- and macro- dynamics of the brain.' Paris, France.

107. Invited speaker, 2015, January 7: "The integrated information theory of consciousness". Symposium on 'Mechanism of Brain and Mind.' Rusutsu, Japan.

108. Invited speaker, 2014, November 13: "The integrated information theory of consciousness". Dept of Anesthesiology, University of Michigan, Ann Arbor, MI.

109. Invited speaker, 2014, September 2: "Integrated information theory and the puzzle of consciousness." 2014 Bernstein Conference. University of Göttingen, Göttingen, Germany.

110. Symposium speaker, 2014, July 30: "Predictive coding and the integrated information theory of consciousness". ICON 2014. Brisbane, Australia.

111. Invited speaker, 2014, July 25: "The integrated information theory of consciousness". Dept of Philosophy, University of Canberra, Canberra, Australia.

112. Invited speaker, 2014, July 23: "The integrated information theory of consciousness". Dept of Philosophy, University of Melbourne, Melboune, Australia.

113. Symposium speaker, 2014, July 21: "Panpsychism and the integrated information theory of consciousness". Symposium on Panpsychism. Bayron Bay, Australia.

114. Invited speaker, 2014, July 16: "The integrated information theory of consciousness". Tutorial, ASSC 18. Brisbane, Australia.

115. Invited Speaker, 2014, May 5: "Consciousness from theory to practice". Mayo Clinic, Dept of Neurology, Rochester MN.

116. Plenary speaker, 2014, April 25: "Integrated Information Theory". 20th anniversary meeting of Toward a science of consciousness. Tucson, AZ.

117. Invited Speaker, 2014, April 7: "Sleep: a time for down-selection?" University of Bergen, Bergen, Norway.

118. Invited Speaker, 2014, April 4: "Sleep: a time for down-selection?" University of Oslo, Oslo, Norway.

119. Invited Speaker, 2014, April 4: "From the phenomenology to the mechanisms of consciousness: an integrated information theory". University of Oslo, Oslo, Norway.

120. Symposium Speaker, 2014, January 8: "Mind, brain, and information. What is consciousness?" 4th International conference on the physics of information. Vieques, Puerto Rico.

121. Invited Speaker, 2013, December 6: "From the phenomenology to the mechanisms of consciousness: an integrated information theory". Columbia University, New York, NY.

122. Invited speaker, 2013, July 13: "Debating the integrated information theory of consciousness". Roundtable at ASSC 17. San Diego, CA.
123. Invited speaker, 2013, July 12: "The integrated information theory of consciousness". Tutorial at ASSC 17. San Diego, CA.
124. Plenary Speaker, 2013 March 27: "Sleep: a time for down selection?" Symposium 'Solving the mystery of sleep.' University of Tsukuba, Japan.
125. Invited speaker, 2013 March 18: "Sleep and synaptic homeostasis". Symposium on sleep. University of Bristol, United Kingdom.
126. Invited Speaker, 2013, March 17: "Sleep and synaptic plasticity". INSPIRE meeting. Viareggio, Italy.
127. Invited Speaker, 2013, January 16: "The burden of wake and the reasons of sleep". Michael S. Aldrich Commemorative Lecture. University of Michigan, Ann Arbor, MI.
128. Plenary Speaker, 2013, January 15: "Consciousness as integrated information". Symposium on 'New Frontiers in Cognitive, Evolutionary, and Computational Models of the Mind.' Lansing, MI.
129. Invited Speaker, 2013, January 11: "Consciousness as integrated information". Psychology Colloquia. Western University, Ontario, Canada.
130. Invited Speaker, 2012, December 19: "Consciousness as integrated information". Max Planck Institute for Mathematics in the Sciences - Leipzig, Germany.
131. Invited Symposium Speaker, 2012, October 17: "Sleep and synaptic plasticity: implications for learning and memory", SfN symposium on 'Sleep Plasticity Pathways: Synapses, Circuits and Memory Consolidation'. New Orleans, LA.
132. Invited Symposium Speaker, 2012, October 13: "Probing effective connectivity with TMS in health and disease". SfN satellite symposium on 'Coordinated Neural Activity Supporting Cognitive Processes.' New Orleans, LA.
133. Plenary Speaker, 2012, October 5: "Coscienza: dalla teoria alla pratica". Lettura Angeleri. Ancona University, Ancona, Italy.
134. Invited Speaker, 2012, October 1: "Sleep and Synaptic Plasticity". Workshop on Synaptic Plasticity. Taormina, Italy.
135. Invited Speaker, 2012, September 27: "Consciousness: From Theory to Practice". The Netherlands Institute for Neuroscience, Amsterdam, The Netherlands.
136. Invited Speaker, 2012, September 26: "Enhancement of Sleep Slow Waves". Neurovation Symposium. Eindhoven, The Netherlands.
137. Invited Speaker, 2012, June 9: "Sleep and Synaptic Homeostasis", 2012 McKnight Conference on Neuroscience. Aspen, CO.
138. Invited Speaker, 2012, May 8: "Consciousness: FROM THEORY TO PRACTICE". XXI Annual Conference Pietro Paoletti. Pavia, Italy.
139. Invited Speaker, 2012, May 3 & 4: "Biology of Sleep". 1st Exploratory Symposium. Max Planck Institute of Psychiatry, Munich, Germany.
140. Invited Speaker, 2012, April 12: "Consciousness, Sleep and Anesthesia". 24th Annual C.R. Stephen Lecture. Washington University School of Medicine, St. Louis, MO.
141. Invited Speaker, 2012, April 5: "An integrated information theory of consciousness". Princeton Neuroscience Institute, Princeton University, NJ.
142. Invited Speaker, 2012, March 13: "Why do we need sleep?" NIH STEP Forum "I'm Not aSLEEP…But that Doesn't Mean I'm Awake". NIH, Bethesda, MA.
143. Invited Speaker, 2011, December 14: "An integrated information theory of consciousness". Weizmann Institute, Rehovot, Israel.
144. Invited Speaker, 2011, October 18: "Sleep, Anesthesia and Consciousness". John W. Severinghaus Lecture,

Anesthesiology 2011 Annual Meeting. Chicago, IL.

145. Invited Speaker, 2011, October 4-5: "Sleep function and synaptic homeostasis". Allen Institute for Brain Science 2011 Annual Symposium: Open questions in Neuroscience. Seattle, WA.

146. Invited Speaker, 2011, June 23, "Principles of information integration and network formation". Brain Connectivity Workshop Montreal 2011. Montreal, Quebec.

147. Invited Speaker, 2011, May 27: "An Integrated Information Theory of Consciousness". Association for Psychological Science 23rd Annual Convention Themed program 'Consciousness: From Neural Systems to Phenomenological Experience'. Washington, DC.

148. Invited Speaker, 2011, May 4: "Consciousness and measures of complexity". MIT150 Symposium 'Brains, Minds and Machines'. MIT, Cambridge, MA.

149. Invited Speaker, 2011, April 28-29: "The Sleeping Brain and the Enchanted Loom of Consciousness". 10th Annual International Bioethics Forum—Manifesting the Mind. Promega Corporation, Madison, WI.

150. Invited Speaker, 2011, February 28: "An integrated information theory of consciousness" and "Computing phi and other measures of complexity". Computational and Systems Neuroscience (Cosyne) 2011 Workshop. Snowbird, Utah.

151. Invited Speaker, 2010, November 19: "An integrated information theory of consciousness". Department of Psychological and Brain Sciences Colloquia. Dartmouth University, Hanover, NH.

152. Invited Speaker, 2010, November 18: "An integrated information theory of consciousness". MIT Colloquium on the Brain and Cognition, Cambridge, MA.

153. Invited Speaker, 2010, November 12: "An integrated information theory of consciousness". HAMLET (Human, Animal, and Machine Learning: Experiment and Theory). University of Wisconsin-Madison, Madison, WI.

154. Speaker, 2010, October 8-10: "The cost of staying awake or, why we can't afford not to sleep". Symposium on sleep/waking, plasticity, and neuroenergetics. Taormina, Italy.

155. Invited Speaker, 2010, October: "Sleep and synaptic plasticity". Scuola Normale Superiore, Pisa, Italy.

156. Invited Speaker, 2010: "Consciousness Explored and Explained". World Science Festival 2010. New York, New York.

157. Invited Speaker, 2009, September 24: "Sleep and Consciousness". XXII Symposium of The Signe and Ane Gyllenberg Foundation: The Many Aspects of Sleep. Hanasaari Congress Center, Espoo, Finland.

158. Invited Speaker, 2009, August 4: "Sleep need and plasticity". NIH Scientific Conference on Sleep. Natcher Conference Center, Bethesda, Maryland.

159. Presidential Lecture, 2009, June 5: "An integrated information theory of consciousness". ASSC XIII. Berlin, Germany.

160. Invited Speaker, 2009, June 2: "Sleep and synaptic plasticity". Janelia Farm Conference on 'Sleep in non-mammalian models'. Janelia Farm Campus, Ashburn, Virginia.

161. Invited Speaker, 2009, April 24-25: "Consciousness and integrated information". The Interdisciplinary Graduate Conference on Consciousness. Boston University, Boston, Massachusetts.

162. Invited Speaker, 2009, April 2: "Consciousness and integrated information". Grand Round. University of Pennsylvania, Philadelphia, Pennsylvania.

163. Invited Speaker, 2009, April 14: "Neurons, Genes, Sleepiness". NIH Scientific Conference on Sleepiness and Health-Related Quality of Life. Natcher Conference Center, Bethesda, Maryland.

164. Invited Speaker, 2008, December 12: "Sleep homeostasis". Cyclotron Research Center, University of Belgium.

165. Invited Speaker, 2008, July 22: "The sleep-waking cycle, neural plasticity, and brain function". NIMH Sponsored: Neurobiological Basis of Circadian Rhythms Interaction with Complex Behaviors. Bethesda North Marriott Hotel and Conference Center, Bethesda, Maryland.

166. Invited Speaker, 2008, July 10: “Toward a Theory of Consciousness”. 2008 Summer Institute in Cognitive Neuroscience. Resort at Squaw Creek, Tahoe, California.
167. Invited Speaker, 2008, June 8: “Advancing Sleep Science Through Interdisciplinary Research”. Meeting of the Sleep Research Society. Baltimore, MD.
168. Invited Speaker, 2008, May 30: “The Brain and Bourne”. World Science Festival. Museum of Modern Art, New York, NY.
169. Invited Speaker, 2008, May 8-9: “Consciousness and the Brain”. A Decade of the Mind III. Des Moines, IA.
170. Invited Speaker, 2008, April 24-25: “An Integrated Information Theory of Consciousness” and “Sleep Function and Synaptic Homeostasis”. Neuroscience Seminar Invited Speaker Series. Baylor College of Medicine, Houston, Texas.
171. Invited Speaker, 2008, April 17-18: “The Integration Information Theory of Consciousness”. Wisconsin Symposium on Emotion. Wisconsin Psychiatric Institute and Clinics, Madison, WI.
172. Invited Symposium Speaker 2008, March 7-12: “Sleep and synaptic plasticity”. Keystone Symposium on ‘Genetics and Biochemistry of Sleep’. Tahoe City, California.
173. Invited Symposium Speaker 2008, March 3-4: “Sleep and learning: A synaptic homeostasis hypothesis”. National Sleep Foundation Meeting on ‘The role of sleep in memory and learning’. Washington D.C.
174. Grand Rounds, 2008, January: “An integrated information theory of consciousness”. Rothman Institute, Toronto, Canada.
175. Invited Speaker, 2007, December: “Under what conditions does consciousness vanish?” Neurology of Consciousness Symposium. NYAS, New York.
176. Invited Speaker, 2007, November: “An integrated information theory of consciousness”. UCSB Distinguished Lecturer Series. Santa Barbara, CA.
177. Invited Speaker, 2007, November: “Consciousness natural and artificial”. Meeting of the Society of Artificial Intelligence. Washington DC.
178. Plenary Speaker, 2007, October: “high-density EEG in sleep – the role of slow waves”. Midwest Sleep Society Meeting. Minneapolis, MN.
179. Invited Speaker, 2007, September: The two-process model - A symposium, Ittingen, Switzerland.
180. Plenary Speaker, 2007, September: “Sleep and synaptic homeostasis”. Symposium of the WFSRS. Cairns, Australia.
181. Invited Speaker, 2007, September: “Sleep slow waves: a new perspective”. Symposium of the WFSRS. Cairns, Australia.
182. Invited Speaker, 2007, September: “What is sleep for?” Symposium of the WFSRS. Cairns, Australia.
183. Invited Speaker, 2007, June: “high-density EEG in sleep – the role of slow waves”. APSS. Minneapolis, MN.
184. Invited Lecturer, 2007, June: “Sleep function and synaptic homeostasis”. Washington University, St. Louis, MO.
185. Plenary Speaker, 2007, May: 1st Decade of the Mind Symposium. George Mason University, VA.
186. Invited Lecturer, 2007, May: “Why does consciousness vanish in early sleep?” ASSC 11. Las Vegas, NV.
187. Grand Rounds, 2007, April: “Sleep function and synaptic homeostasis”. Harvard Medical School, Cambridge, MA.
188. Invited Speaker, 2007, April: “An integrated information theory of consciousness”. Harvard University, Cambridge, MA.
189. Grand Rounds, 2007, April: “Sleep function and synaptic homeostasis”. Yale University, New Haven, CT.
190. Invited lecturer, 2007, April: “The synaptic homeostasis hypothesis. NIDA Cutting Edge Seminar Series.

Bethesda, MD.

191. Invited Speaker, 2007, March: high-density EEG and spontaneous brain activity. Medical Biotechnology Series, Madison, WI.

192. Invited Speaker, 2007, March: “An integrated information theory of consciousness”. (Koch/Tononi symposium) UCSF. San Francisco, CA.

193. Invited Lecturer, 2006, December: “Consciousness and information integration”. Medical College of Wisconsin, Milwaukee, WI.

194. Invited Lecturer, 2006, November: “The enigma of sleep”. Brandeis University, Waltham, MA.

195. Invited Lecturer, 2006, October: “Modeling sleep homeostasis”. MBI Symposium on sleep modeling. Columbus, OH.

196. Prize Lecturer, 2006, October: “The mystery of sleep function”. Pisa Sleep Award. Pisa, Italy.

197. Invited Lecturer, 2006, October: “Sleep function and the brain”. Lubeck Symposia. Lubeck, Germany.

198. Invited Lecturer, 2006, October: “Sleep function and the brain”. Johanna Quandt Symposium. Frankfurt, Germany.

199. Talairach Lecture, 2006, June: “The enigma of sleep”. Human Brain Mapping. Florence, Italy.

200. Invited Lecturer, 2006, June: “Sleep function and synaptic homeostasis”. Pioneer Lecture. NIMH, Washington DC.

201. Invited Lecturer, 2006, May: “Mood disorders and sleep homeostasis”. Society of Biological Psychiatry. Toronto, Canada.

202. Invited Lecturer, 2006, May: “Sleep function and synaptic homeostasis”. Pioneer Symposium. Toronto, Canada.

203. Invited Lecturer, 2006, April: “Sleep function and synaptic homeostasis”. Zurich University, Switzerland.

204. Invited Lecturer, 2006, April: “Sleep function and synaptic homeostasis”. University of Pennsylvania, Philadelphia, PA.

205. Keynote Lecture, 2006, April: “The information integration theory of consciousness”. Toward a Science of Consciousness 2006. Tucson, Arizona.

206. Invited Lecturer, 2006, March: NIH Neuroimaging in Sleep Research conference, Washington DC.

207. Invited Lecturer, 2006, February: “The synaptic homeostasis hypothesis”. The Salk Institute, San Diego, CA.

208. Invited Lecturer, 2006, February: “The synaptic homeostasis hypothesis”. Neural Control of Behavior Symposium 2006. UCLA, Los Angeles, CA.

209. Invited Lecturer, 2005, December: “The synaptic homeostasis hypothesis”. National Center on Sleep Disorders Research (NCSDR) Symposium.

210. Magisterial Lecturer, 2005, November: “Sleep and synaptic homeostasis”. Bio-X ‘Frontiers in Interdisciplinary Biosciences’. Stanford University, CA.

211. 5th Raymond and Beverly Sackler Distinguished Visiting Neuroscientist, 2005 November: “Sleep and its functions”. University of Toronto, Toronto, Canada.

212. Invited Speaker, 2005, November: “What is the biological basis of consciousness?” Department of Genetics Symposium. University of Wisconsin, Madison, WI.

213. Invited Speaker, 2005, November: “Breakdown of cortical effective connectivity during NREM sleep”. Rankin Symposium. Madison, WI.

214. Invited Speaker, 2005, September: “Consciousness, information integration, and the brain”. Krasnow Institute Seminar. George Mason University, Fairfax, VA.

215. Invited Speaker and Workshop Panelist, 2005, August: “Consciousness and binding”. Peter Wall Summer Institute. University of British Columbia, Vancouver.

216. Invited Lecture, 2005, August: “Sleep and synapses. Gordon Conference in chronobiology”. Salve Regina University, Newport, RI.

217. Plenary Lecturer, 2005, June: “The information theory of consciousness”. ASSC 9. Caltech, Pasadena, CA.

218. Invited Lecturer, 2005, June: “Sleep and its functions”. Center for Sleep Research Retreat. University of Pennsylvania, Philadelphia.

219. Invited Lecturer, 2005, June: “Sleep and synaptic homeostasis”. University of Illinois Symposia, Urbana.

220. Invited lecturer, 2005, June: “The synaptic homeostasis hypothesis”. University of Pennsylvania, Philadelphia, PA.

221. Invited Lecturer, 2005, March: “Sleep function and synaptic homeostasis”. Integrative Neuroscience Seminars. NIMH, Washington DC.

222. Invited Lecturer, 2005, January: “Consciousness and the Brain”. Washington University Symposia. St. Louis, MO.

223. Invited Speaker, 2004, December: “Sleep and bipolar disorder”. 43rd Annual Meeting of the American College of NeuroPsychopharmacology. San Juan, Puerto Rico.

224. Keynote Presentation, 2004, October: “Sleep Research: from bench to bedside”. UW Medical School, Medical Student Summer Research Fall (together with R. Benca and C. Cirelli). Madison, WI

225. Invited Speaker, 2004, November: “Understanding recovery from brain injury: Putting network models to work”. McDonnell Workshop. Millcroft Inn, Alton, Ontario, Canada.

226. Public Lecture, October, 2004: “Recollections of a neuroscientist”. Trento, Italy.

227. Public Lecture, October, 2004: “The weight of wakefulness”. Ancona, Italy.

228. Invited Lecture, 2004, September: “Sleep and synaptic homeostasis”. Zurich, Switzerland.

229. Invited Lecture, 2004, September: “Brain mechanisms of consciousness”. INSERM. Paris, France.

230. Distinguished Lecture, 2004, September: “The Mathematics of Consciousness”. Ecole Normale Superieure, Paris, France.

231. Invited Speaker, 2004, September: “Sleep and synaptic homeostasis”. 2nd International Sleep Disorders Forum. Paris, France.

232. Invited Lecture, 2004, June: “The Locus Coeruleus and brain plasticity: A new view of activating systems”. APSS 18th annual meeting. Philadelphia, PA.

233. Invited Speaker, 2004, May: “Communication in Brain Systems”. Cold Spring Harbor Symposia. New York, NY.

234. Invited Speaker, 2003, November: “Target Identification and Research”. Wisconsin Biotechnology Symposium. Madison, WI.

235. Invited Speaker, 2003, November: “Brain Energetics and Information Processing: What is your brain doing when it is just sitting there”. McDonnell Workshop. IBM Palisades, Palisades, New York.

236. Prize Lecturer, 2003, September: Pfizer Sleep Science Award, Ann Arbor, Michigan.

237. Guest Speaker, 2003, September: Ann Arbor Neuroscience Series, Ann Arbor, Michigan.

238. Invited Lecture, 2003, April: “Consciousness and information integration”. Santa Fe Institute Colloquia. Santa Fe, New Mexico.

239. La teoria del complesso cosciente

240. Misurare la coscienza

241. Coscienza e cervello

242. Guest Lecturer, 2003, January: Lezioni Italiane. Roma, Italy.

243. Invited Speaker, 2002, November: “A recipe for consciousness”. Chaos and Complex Systems Seminars. University of Wisconsin, Madison, WI.

244. Inaugural Lecture, 2002, October: “The neural substrate of consciousness: Implications for psychiatry”. 5th quadriennial meeting of the Societa’ Italiana di Psichiatria Biologica. Napoli, Italy.

245. Invited Lecture, 2002, June: “A neural theory of consciousness”. APSS 16th annual meeting. Seattle, WA.

246. State of the Art Lecture, 2002, June: “Sleep lessons from invertebrates”. ESRS meeting. Rejkjavik, Iceland.

247. Invited Speaker, 2002, April: “Consciousness and the brain”. Department of Veterinary Medicine Cluster Seminars. University of Wisconsin, Madison,WI.

248. Invited Speaker, 2002, April: “Consciousness and the brain. Brain awareness week”. Neuroscience Training Program. University of Wisconsin, Madison, WI.

249. Invited Speaker, 2002, March: “Neural correlates of consciousness”. Special Seminars in Neuroscience. University of Pennsylvania, Philadelphia, PA.

250. Invited Speaker, 2002, February: “Neural correlates of consciousness”. Special Lectures in Neuroscience. Purdue University, West Lafayette, IN.

251. Speaker and Chair, 2002, January: “Subcortical control of cortical processing”. Winter Brain Conference. Snowmass, CO.

252. Invited Speaker, 2001, December: “Consciousness integrated and differentiated”. Psychology Proseminars. University of Wisconsin, Madison, WI.

253. Closing Lecture, 2001, October: “A molecular window on sleep and wakefulness”. IVth World Congress on Sleep. Montevideo, Uruguay.

254. Invited Speaker, 2001, September: NIMH Workshop on Insomnia, Bethesda, MD.

255. Invited Speaker, 2001, May: “Machine consciousness”. Cold Spring Harbor Symposia. New York, NY.

256. Plenary Speaker, Frontiers of Science Lecture and Award, 2001, May: “Consciousness integrated and differentiated”. American Psychiatric Association Annual Meeting. New Orleans, LA.

257. Invited Speaker, 2000, December: “Consciousness and the brain”. Utrecht, Holland.

258. Invited Speaker, 2000, December: “Consciousness: a neurobiological perspective”. Groningen, Holland.

259. Magisterial Lecturer, 2000, December: “Neurobiologia della coscienza”. Universita' Cattolica, Roma, Italy.

260. Invited Speaker, 2000, November: “Scientific approaches to consciousness: Tononi vs. Crick and Koch”. Helmholtz Club. UC Irvine, Irvine, CA.

261. Invited Speaker, 2000, October: “Sleep deprivation: a molecular perspective”. Chris Gillin Festschrift. San Diego, CA.

262. Invited Speaker, 2000, October: “Investigating the neural substrates of conscious experience”. Center for Neurobiology Invited Seminar Series. Madison, WI.

263. Invited Speaker, 2000, September: “Consciousness integrated and differentiated”. Sloan Center for Neurobiology invited seminar. Caltech, Pasadena, CA.

264. Invited Speaker, 2000, September: “Evaluating the molecular correlates of sleep and waking”. International Congress ‘Sleep medicine on the eve of the third millennium’. Bologna, Italy.

265. Invited Speaker, 2000, July: “Investigating the neural substrates of conscious experience”. San Diego Sleep and Chronobiology Seminars. UCSD, San Diego.

266. Invited Speaker, 2000, June: “Consciousness integrated and differentiated”. 4th Annual Meeting of the Association for the Scientific Study of Consciousness (ASSC4). Bruxelles, Belgium.

267. Invited Speaker, 2000, June: “Correlates of sleep and waking in Drosophila melanogaster”. Associated Professional Sleep Societies 14th Annual Meeting (APSS). Las Vegas, US.

268. Guest Lecturer, 2000, May: “Consciousness and complexity”. Columbia University, New York.

269. Guest Lecturer, 2000, May: “Mente-Cervello: L'atto di coscienza”. Incontri di scienza e filosofia. Ancona, Italy.

270. Invited Speaker, 2000, May: “Consciousness and complexity”. Toward animal models of attention and consciousness. Cold Spring Harbor, New York.

271. Guest Lecturer, 2000, March: “Waking, dreaming, sleeping, and the conscious brain”. Speaker Series on Neuroscience. Harvey Mudd College, Claremont, California.

272. Invited Speaker, 2000, January: “Brain real estate: when function doesn't follow location”. 33rd Annual Winter Conference on Brain Research. Breckenridge, Colorado.

273. Speaker, 1999, October: “Sleep, waking, and the fly”. World Federation of Sleep Research Societies. Dresden, Germany.

274. Guest Lecturer, 1999, October: “Consciousness and Complexity”. Symposium on emotion and knowledge. La Caixa Foundation, Barcelona, Spain.

275. Guest Lecturer, 1999, June: “Molecular correlates of sleep, waking, and sleep deprivation”. Human Science Frontier Workshop IX. Strasbourg, France.

276. Guest Lecturer, 1999, March: “Changes in Gene Expression during Behavioral States and after Chronic Neuroleptic Treatment”. Novartis Symposia. Basel, Switzerland.

277. Guest Lecturer, 1999, March: “Sleep and Circadian Rhythms: New Perspectives”. Zurich, Switzerland.

278. Magisterial Lecturer, 1998, November: “From Neurodynamics to Psychodynamics”. Los Angeles Psychological Association, Pasadena, CA.

279. Guest Lecturer, 1998, October: Nobel Symposium on Schizophrenia: Pathophysiological Mechanisms, Stockholm.

280. Guest Lecturer, 1998, July: Gulbenkian Symposium on Cognitive Neuroscience: Consciousness. Convento de Arrabida, Lisbon, Portugal.

281. Guest Lecturer, 1998, April: “Complexity and Functional Integration: A Theoretical Perspective”. Cognitive Neuroscience Society. San Francisco, CA.

282. Guest Lecturer, 1998, April: “Vigilance Systems and Control of Gene Expression”. New Directions in Understanding Sleep Need and Human Vulnerability to Sleep Loss. North Carolina Biotechnology Center, Research Triangle Park.

283. Guest Lecturer, 1998, March: “Integration and Dissociation in Brain Function”. 65th Anniversary of The Institute for Psychoanalysis. Chicago, IL.

284. Lecturer, 1998, March: “Cellular Correlates of Sleep and Waking”. 65th Stated Meeting of NRP Associates. The Neurosciences Institute, San Diego, CA.

285. Guest Lecturer, 1997, July: “Differences in gene expression between wakefulness and sleep revealed by mRNA differential display”. IUPS World Physiology Meeting. St. Petersburg, Russia.

286. Guest Lecturer, 1997 June: “Neural Integration and its Disorders”. World Psychiatry Association Meeting. Rome, Italy.

287. Complexity: The Challenge of Modern Biology

288. Consciousness: Integration and Reentry

289. Evolutionary Constraints: Value and Value Systems

290. Guest Lecturer, 1997, June: “Lezioni Lincee”. Pisa, Italy (in collaboration with G.M. Edelman).

291. Guest Lecturer, 1997, May: “Consciousness: At the Frontiers of Neurosciences. Montreal”. Consciousness and the Integration of Brain Function Conference. Montreal, Quebec.

292. Guest Lecturer, 1996, March: “Molecular genetic approaches to sleep regulation”. International Workshop on Basic Sleep Regulating Mechanisms. Ascona, Switzerland.

293. Speaker, 1995, November: “The effects of synchrony on neural interactions”. 25th Annual Meeting of the Society for Neuroscience. San Diego, California.

294. Lecturer, 1995, October: “Cortical integration”. The Neurosciences Institute Inaugural Symposium on

'Understanding the brain'.

295. Magisterial Lecturer, 1995, September: "Selectionist approaches to brain function". Universita' Cattolica, Roma, Italy.

296. Guest Lecturer, 1995, September: "Computer models of cortical integration". Annual Meeting of the International Society of Psychophysiology. Troina, Italy.

297. Guest Lecturer, 1995, September, "Functional reorganization of the brain during sleep". Second International Congress of the World Federation of Sleep Research Societies. Nassau, Bahamas.

298. Guest Lecturer, 1995, May: "Reconciling functional segregation and integration in the visual system". International Meeting on 'Cerebral cortex, functions and development'. Lyon, France.

299. Guest Lecturer, 1995, March: "Measuring neural complexity." University of California, San Francisco, CA.

300. Speaker, 1994, November: "Neural complexity and the relationship between functional segregation and integration in the nervous system". 24th Annual Meeting of the Society for Neuroscience. Miami Beach, Florida

301. Guest Lecturer, 1994, August: "Functional segregation and integration in the nervous system: theory and models". International Symposium on the Neurobiology of the Somatosensory Cortex, Stockholm, Sweden.

302. Guest Lecturer, 1994, July: "Functional segregation and integration in the visual system". McDonnel Summer Institute in Cognitive Neuroscience. UC-Davis, Davis, CA.

303. Magisterial Lecturer, 1994, March: "The problem of cortical integration". Plenary lecture, Annual Meeting of the Italian Physiological Society. Firenze, Italy.

304. Speaker, 1993, September: "Modeling functional segregation and integration in the nervous system". Summer Atelier. The Neurosciences Institute, Sand Diego, CA.

305. Speaker, 1993, May: "The locus coeruleus and immediate early genes in spontaneous and forced wakefulness". Second International Symposium on the Locus Coeruleus. Orcas Island, Washington.

306. Speaker, 1993, April: "Synthetic neural modeling and functional neuroimaging". Neural Modeling and Functional Neuroimaging. Neurosciences Institute, New York.

307. Guest Lecturer, 1992, November: "Reentry and the integration of brain function". Columbia University, New York

308. Speaker, 1992, October: "Modeling integration in the visual cortex". 22th Annual Meeting of the Society for Neuroscience. Anaheim, CA.

309. Guest Lecturer, 1992, September: "The brain and the problem of integration". Science and Human Dimension. Jesus College, Cambridge.

310. Lecturer, 1992, May: "Reentry and integration of brain function". Selectionism and the Brain. The Neurosciences Institute, New York, NY.

311. Guest Lecturer, 1991, September: "Modeling perceptual grouping and figure ground segregation: How the brain may avoid some computational pitfalls". International School of Neuroscience, 3rd Course, Praglia, Padova

312. Guest Lecturer, 1991, June: "The neural basis of Gestalt". Cornell University, New York

313. Speaker, 1991, May: "A model of perceptual grouping and figure ground segregation". Neuropsychology Course, The Neurosciences Institute, New York, NY.

314. Speaker, 1989, June: "Pontine muscarinic receptors display short-term changes related to sleep-waking states". 6th Capo Boi Conference on Neuroscience. Villasimius, Italy.

315. Speaker, 1989, May: "Changes in pontine muscarinic receptor binding during sleep-waking states". Congresso della Societa' Italiana di Fisiologia. Firenze, Italy.

316. Speaker, 1988, September: "Effects on sleep of clonidine microinjections in the dorsal pontine tegmentum of the cat". 9th European Congress of Sleep Research. Jerusalem.

Patents:

1. United States Patent 5,283,839: Apparatus capable of figure-ground segregation (Olaf Sporns, Giulio Tononi, Gerald M. Edelman)
2. United States Patent 6,730,287: Vigilance nucleic acids and related diagnostic screening and therapeutic methods (Giulio Tononi, Chiara Cirelli, Paul J. Shaw, Ralph J. Greenspan)
3. United States Patent Pending 20040197266: Methods for identifying compounds that modulate vigilance states (Giulio Tononi, Chiara Cirelli, Paul J. Shaw, Ralph J. Greenspan)
4. United States Patent Pending 20040143855 Ion channels as targets for sleep-related drugs (Giulio Tononi, Chiara Cirelli)
5. United States Patent Pending 20040143856 Nonpharmacological approaches for sleep enhancement (Giulio Tononi)
6. United States Patent Pending: P130098US02 System and method for sleep session management based on slow wave sleep activity in a subject (Giulio Tononi, Brady Riedner, Michele Bellesi, Gary Garcia Molina, Sander Pastoor, Stefan Pfundtner)
7. United States Patent Pending: P130129US02 Adjustment of sensory stimulation intensity to enhance sleep slow wave activity (Giulio Tononi, Michele Bellesi, Brady Riender, Gary Garcia Molina)
8. United States Patent 20,170,083,081: System and Method for Analyzing a Sensory Stream Using Reservoir Computing (Mikko Lipasti, Atif Hashmi, Andrew Nere, Giulio Tononi)

MANUSCRIPTS REVIEWED FOR:

American Journal of Physiology
American Journal of Psychiatry
BMC Neuroscience
Brain
Brain Research
Current Biology
European Journal of Neuroscience
Journal of Applied Physiology
Journal of Neuroscience
Journal of Physiology
Journal of Sleep Research
Nature
Nature Communications
Nature Neuroscience
Neuroimage
Neuron
Neuropsychopharmacology
Neuroscience
Neuroscience Letters
PNAS
Plos Computational Biology
Progress in Neurobiology
Sleep
Sleep Medicine Review
Science
Trends in Neuroscience
Trends in Cognitive Sciences

MENTORING

Graduate students, Neuroscience Training Program, M.D. Ph.D. Training Program

Member of the Thesis Committee:

2007-2011	Dash, Michael (brain metabolism and sleep)
2009-2013	Nelson, Aaron (sleep and functional connectivity in young mice)
2012-2016	Rodriguez, Alexander (mechanisms underlying sleep need)

Major Professor, PhD students:

2002-2008	Esser, Steven (Investigating Cortical Connectivity & Plasticity with TMS/EEG and Computer Modeling)
2005-2011	Riedner, Brady (Morphological and spatio-temporal character-ization of sleep slow waves using hdEEG)
2005-2010	Faraguna, Ugo (Sleep and BDNF)
2008-2012	Landsness, Eric (Selective deprivation of slow waves and its effect on motor learning in humans)
2011-2016	Hoel, Erik (Quantifying causal emergence)
2013-2016	Funk, Chadd (Cortico-thalamic mechanisms of disconnection)
2018-2019	Bugnon, Tom
2016-2023	Mayner, Will (Integrated Information, Matching and Fitness)
2016-Present	Findlay, Graham (Sleep in the hippocampus)
2020-Present	Szczotka, Joanna (Mechanisms of sleep-dependent sensory disconnection)
2023-Present	Haber, Ido (Temporal interference)
2023-Present	Schaeffer, Erin (Temporal interference)

Post-doctoral students

2005-2008	Dr. Vlad Vyazovskiy
2009-2013	Dr. Yuval Nir
2007-2011	Dr. Fabio Ferrarelli
2008-2011	Dr. Simone Sarasso
2010-2012	Dr. Ugo Faraguna
2010-2016	Dr. Michele Bellesi
2011-2013	Dr. Masifumi Oizumi
2011-2014	Dr. Atif Hashmi
2011-2014	Dr. Francesca Siclari
2011-2016	Dr. Luisa De Vivo
2012-2013	Dr. Emmanuel Carrera
2012-2014	Dr. Giulio Bernardi
2012-2015	Dr. Melanie Boly
2012-2015	Dr. Larissa Albantakis
2012-2017	Dr. Sakiko Honjoh
2013-2016	Dr. Armand Mensen
2013-2016	Dr. Olivia Gosseries
2013-2018	Dr. Shun Sasai
2014-2016	Dr. Lampros Perogamvros (MD training)
2014-2014	Dr. Jaakko Nieminen
2014-2015	Dr. Anna Castelnovo (MD training)
2014-2019	Dr. Benjamin Baird (training grant)

2014-2019	Dr. William Marshall
2015-2016	Dr. Andrew Haun
2015-2016	Dr. Sivesh Pillay
2015-2017	Dr. Chen Song
2016-2017	Dr. Damian Sowinski
2016-2017	Dr. Sabrina Streipert
2016-2019	Dr. Elsa Juan
2019-2020	Dr. Silvère Gangloff
2016-2020	Dr. Amandine Valomon
2019-2021	Dr. Anna Cattani
2016-2021	Dr. Leonardo de Silva Barbosa
2018-Present	Dr. Matteo Grasso
2018-2022	Dr. Erick Chastain
2019-2022	Dr. Thomas Vanasse
2019-2022	Dr. Keiko Fujii
2019-Present	Dr. Bjorn Juel
2021-2024	Dr. Alireza Zaeemzadeh
2024-present	Dr. Francis Fan

Tenure track faculty

2013-2015	Mentoring committee, Dept of Psychiatry (Michael Koenigs, Assistant Professor, Psychiatry)
2012-2017	Mentoring committee, Dept of Psychiatry (David Plante, Assistant Professor, Psychiatry)
2021-present	Mentoring committee, Dept of Psychiatry (Melanie Boly, Assistant Professor, Neurology)