Stanford

Peter Tass

Professor of Neurosurgery

CONTACT INFORMATION

- **Administrative Contact**

  Liana Choi - Administrative Associate II

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Bio

BIO

Dr. Peter Tass investigates and develops neuromodulation techniques for understanding and treating neurologic conditions such as Parkinson's disease, epilepsy, dysfunction following stroke and tinnitus. He creates invasive and non-invasive therapeutic procedures by means of comprehensive computational neuroscience studies and advanced data analysis techniques. The computational neuroscience studies guide experiments that use clinical electrophysiology measures, such as high density EEG recordings and MRI imaging, and various outcome measures. He has pioneered a neuromodulation approach based on thorough computational modelling that employs dynamic self-organization, plasticity and other neuromodulation principles to produce sustained effects after stimulation. To investigate stimulation effects and disease-related brain activity, he focuses on the development of stimulation methods that cause a sustained neural desynchronization by an unlearning of abnormal synaptic interactions. He also performs and contributes to pre-clinical and clinical research in related areas.

ACADEMIC APPOINTMENTS

- Professor, Neurosurgery
- Member, Bio-X
- Member, Wu Tsai Human Performance Alliance
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Member of the European Academy of Sciences and Arts, European Academy of Sciences and Arts, Salzburg, Austria (2012)
- Nicolaus August Otto Innovation Prize, City of Cologne, Germany (2011)
- German Innovation Award in Medicine, Worch Foundation (2011)
- Rapid Response Innovation Award, The Michael J. Fox Foundation for Parkinson's Research (2010)
- Rapid Response Innovation Award, The Michael J. Fox Foundation for Parkinson's Research (2009)
- Runner-up for the German future prize 2006, President of the Federal Republic of Germany (2006)
- Erwin Schrödinger prize, Hermann von Helmholtz Association of German Research Centres (2005)

- Fritz Winter prize, Fritz Winter foundation, Academy of Sciences of North Rhine-Westphalia, Germany (2000)

PROFESSIONAL EDUCATION

- Habilitation thesis, RWTH Aachen University, Aachen, Germany , Physiology (2001)
- Diploma (master's degree), University of Stuttgart, Germany , Mathematics (1993)
- PhD, University of Stuttgart, Germany , Physics (1993)
- MD, Universities of Ulm and Heidelberg, Germany , Medicine (1989)

LINKS

- Peter Tass Lab: http://med.stanford.edu/tass-lab
- Peter Tass on ResearchGate: https://www.researchgate.net/profile/Peter_Tass
- Peter Tass on Frontiers Loop: https://loop.frontiersin.org/people/2560/overview
- Stanford Neurosurgery: http://med.stanford.edu/neurosurgery.html
- Peter Tass on Google Scholar: https://scholar.google.com/citations?hl=en&user=IGB-wHkAAAAJ&view_op=list_works&gmla=AJsN-F5LDooMGVic4VCbDUnrs7kRM0ppgo4yj2nTL16VUu80elWkTxaW-S5tbcfR7_VWgTRDGB1UBFFEnBK-0364c-Eqil46exVk10ntrn9Ua0EGtgTYqY4
- Wu Tsai Neurosciences Institute: https://neuroscience.stanford.edu/people/peter-tass

Research & Scholarship

CLINICAL TRIALS

- Vibrotactile Coordinated Reset (VCR): A Treatment for Early Stage Parkinson's Disease, Not Specified

Teaching

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Kanishk Chauhan, Roar Jakob Sorensen, Julia Tom, Sa Zhou

Publications

PUBLICATIONS

- **Calcium-based synaptic and structural plasticity link pathological activity to synaptic reorganization in Parkinson's disease.** *Science advances*
  McLoughlin, C., Kromer, J. A., Lowery, M., Tass, P. A.
  2025; 11 (45): eadw7421
- **Electrical Coordinated Reset stimulation induces network desynchronization in an in vivo model of status epilepticus.** *Epilepsy & behavior : E&B*
  Ehrens, D., Aeed, F., Otor, Y., Charu, V., Razavi, B., Sarma, S. V., Schiller, Y., Tass, P. A.
  2025; 165: 110300
- **Editorial: Neuromodulation using spatiotemporally complex patterns.** *Frontiers in neuroinformatics*
  Tass, P. A., Bokil, H.
  2024; 18: 1454834
- **Synaptic reorganization of synchronized neuronal networks with synaptic weight and structural plasticity.** *PLoS computational biology*
  Chauhan, K., Neiman, A. B., Tass, P. A.
  2024; 20 (7): e1012261
- **Simulated dataset on coordinated reset stimulation of homogeneous and inhomogeneous networks of excitatory leaky integrate-and-fire neurons with spike-timing-dependent plasticity.** *Data in brief*

Kromer, J. A., Tass, P. A.
2024; 54: 110345

- **Coordinated reset stimulation of plastic neural networks with spatially dependent synaptic connections.** *Frontiers in network physiology*
  Kromer, J. A., Tass, P. A.
  2024; 4: 1351815
- **Emerging wearable technologies for multisystem monitoring and treatment of Parkinson's disease: a narrative review.** *Frontiers in network physiology*
  Kehnemouyi, Y. M., Coleman, T. P., Tass, P. A.
  2024; 4: 1354211
- **Sequences and their shuffling may crucially impact coordinated reset stimulation - A theoretical study.** *Brain stimulation*
  Kromer, J. A., Tass, P. A.
  2024
- **Synaptic network structure shapes cortically evoked spatio-temporal responses of STN and GPe neurons in a computational model.** *Frontiers in neuroinformatics*
  Kromer, J. A., Bokil, H., Tass, P. A.
  2023; 17: 1217786
- **Perspectives on adaptive dynamical systems.** *Chaos (Woodbury, N.Y.)*
  Sawicki, J., Berner, R., Loos, S. A., Anvari, M., Bader, R., Barfuss, W., Botta, N., Brede, N., Franović, I., Gauthier, D. J., Goldt, S., Hajizadeh, A., Hövel, et al
  2023; 33 (7)
- **Decoupling of interacting neuronal populations by time-shifted stimulation through spike-timing-dependent plasticity.** *PLoS computational biology*
  Madadi Asl, M., Valizadeh, A., Tass, P. A.
  2023; 19 (2): e1010853
- **Asymmetric adaptivity induces recurrent synchronization in complex networks.** *Chaos (Woodbury, N.Y.)*
  Thiele, M., Berner, R., Tass, P. A., Scholl, E., Yanchuk, S.
  2023; 33 (2): 023123
- **Synaptic reshaping of plastic neuronal networks by periodic multichannel stimulation with single-pulse and burst stimuli.** *PLoS computational biology*
  Kromer, J. A., Tass, P. A.
  2022; 18 (11): e1010568
- **Dynamics of phase oscillator networks with synaptic weight and structural plasticity.** *Scientific reports*
  Chauhan, K., Khaledi-Nasab, A., Neiman, A. B., Tass, P. A.
  2022; 12 (1): 15003
- **Pilot study of responsive nucleus accumbens deep brain stimulation for loss-of-control eating.** *Nature medicine*
  Shivacharan, R. S., Rolle, C. E., Barbosa, D. A., Cunningham, T. N., Feng, A., Johnson, N. D., Safer, D. L., Bohon, C., Keller, C., Buch, V. P., Parker, J. J., Azagury, D. E., Tass, et al
  2022
- **Vibrotactile coordinated reset stimulation for the treatment of Parkinson's disease.** *Neural regeneration research*
  Tass, P. A.
  1800; 17 (7): 1495-1497
- **Long-Lasting Desynchronization of Plastic Neuronal Networks by Double-Random Coordinated Reset Stimulation.** *Frontiers in network physiology*
  Khaledi-Nasab, A., Kromer, J. A., Tass, P. A.
  2022; 2: 864859
- **Spike-Timing-Dependent Plasticity Mediated by Dopamine and its Role in Parkinson's Disease Pathophysiology.** *Frontiers in network physiology*
  Madadi Asl, M., Vahabie, A. H., Valizadeh, A., Tass, P. A.

2022; 2: 817524

- **Long-Lasting Desynchronization of Plastic Neuronal Networks by Double-Random Coordinated Reset Stimulation** *Frontiers in Network Physiology*
  Khaledi-Nasab, A., Kromer, J. A., Tass, P. A.
  2022; 2
- **Exploiting modern multi-site electrodes for counteracting abnormal synchronization**
  Nasab, A., Kromer, J., Tass, P.
  SPRINGER.2021: S181
- **Long-lasting desynchronization using randomized spatio-temporal stimulus patterns**
  Kromer, J., Nasab, A., Tass, P.
  SPRINGER.2021: S181-S183
- **Treatment Tone Spacing and Acute Effects of Acoustic Coordinated Reset Stimulation in Tinnitus Patients.** *Frontiers in network physiology*
  Munjal, T., Silchenko, A. N., Pfeifer, K. J., Han, S. S., Yankulova, J. K., Fitzgerald, M. B., Adamchic, I., Tass, P. A.
  2021; 1: 734344
- **Publisher Correction: Multistability in a star network of Kuramoto-type oscillators with synaptic plasticity.** *Scientific reports*
  Ratas, I., Pyragas, K., Tass, P. A.
  2021; 11 (1): 18603
- **Long-Term Desynchronization by Coordinated Reset Stimulation in a Neural Network Model With Synaptic and Structural Plasticity** *FRONTIERS IN PHYSIOLOGY*
  Manos, T., Diaz-Pier, S., Tass, P. A.
  2021; 12: 716556
- **Multistability in a star network of Kuramoto-type oscillators with synaptic plasticity.** *Scientific reports*
  Ratas, I., Pyragas, K., Tass, P. A.
  2021; 11 (1): 9840
- **Accumbens coordinated reset stimulation in mice exhibits ameliorating aftereffects on binge alcohol drinking.** *Brain stimulation*
  Ho, A. L., Feng, A. Y., Barbosa, D. A., Wu, H. n., Smith, M. L., Malenka, R. C., Tass, P. A., Halpern, C. H.
  2021
- **Clinical Efficacy and Dosing of Vibrotactile Coordinated Reset Stimulation in Motor and Non-motor Symptoms of Parkinson's Disease: A Study Protocol.** *Frontiers in neurology*
  Pfeifer, K. J., Cook, A. J., Yankulova, J. K., Mortimer, B. J., Erickson-DiRenzo, E., Dhall, R., Montaser-Kouhsari, L., Tass, P. A.
  2021; 12: 758481
- **Long-Lasting Desynchronization Effects of Coordinated Reset Stimulation Improved by Random Jitters** *Frontiers in physiology*
  Khaledi-Nasab, A., Kromer , J., Tass, P. A.
  2021: 1446
- **Coordinated Reset Vibrotactile Stimulation Induces Sustained Cumulative Benefits in Parkinson's Disease.** *Frontiers in physiology*
  Pfeifer, K. J., Kromer, J. A., Cook, A. J., Hornbeck, T., Lim, E. A., Mortimer, B. J., Fogarty, A. S., Han, S. S., Dhall, R., Halpern, C. H., Tass, P. A.
  2021; 12: 624317
- **A Single Case Feasibility Study of Sensorimotor Rhythm Neurofeedback in Parkinson's Disease.** *Frontiers in neuroscience*
  Cook, A. J., Pfeifer, K. J., Tass, P. A.
  2021; 15: 623317
- **Information processing in tree networks of excitable elements.** *Physical review. E*
  Khaledi-Nasab, A., Chauhan, K., Tass, P. A., Neiman, A. B.
  2021; 103 (1-1): 012308
- **Information processing in tree networks of excitable elements** *Information processing in tree networks of excitable elements*
  Khaledi Nasab , A., Chauhan , K., Tass, P., Neiman , A.
  2021; 103

- **Entrainment of a network of interacting neurons with minimum stimulating charge** *PHYSICAL REVIEW E*
  Pyragas, K., Fedaravicius, A. P., Pyragiene, T., Tass, P. A.
  2020; 102 (1): 012221
- **Long-Lasting Desynchronization of Plastic Neural Networks by Random Reset Stimulation** *Frontiers in physiology*
  Khaledi Nasab, A., Kromer , J., Tass , P.
  2021; 11: 622620
- **Long-lasting desynchronization by decoupling stimulation** *PHYSICAL REVIEW RESEARCH*
  Kromer, J. A., Tass, P. A.
  2020; 2 (3)
- **Long-Lasting Desynchronization of Plastic Neural Networks by Random Reset Stimulation.** *Frontiers in physiology*
  Khaledi-Nasab, A. n., Kromer, J. A., Tass, P. A.
  2020; 11: 622620
- **Technology of deep brain stimulation: current status and future directions.** *Nature reviews. Neurology*
  Krauss, J. K., Lipsman, N. n., Aziz, T. n., Boutet, A. n., Brown, P. n., Chang, J. W., Davidson, B. n., Grill, W. M., Hariz, M. I., Horn, A. n., Schulder, M. n., Mammis, A. n., Tass, et al
  2020
- **Impact of number of stimulation sites on long-lasting desynchronization effects of coordinated reset stimulation** *CHAOS*
  Kromer, J. A., Khaledi-Nasab, A., Tass, P. A.
  2020; 30
- **Brain-Responsive Neurostimulation for Loss of Control Eating: Early Feasibility Study.** *Neurosurgery*
  Wu, H. n., Adler, S. n., Azagury, D. E., Bohon, C. n., Safer, D. L., Barbosa, D. A., Bhati, M. T., Williams, N. R., Dunn, L. B., Tass, P. A., Knutson, B. D., Yutsis, M. n., Fraser, et al
  2020
- **Adaptive delivery of continuous and delayed feedback deep brain stimulation - a computational study.** *Scientific reports*
  Popovych, O. V., Tass, P. A.
  2019; 9 (1): 10585
- **Acoustic coordinated reset therapy for tinnitus with perceptually relevant frequency spacing and levels** *Scientific Reports*
  Tass, P. A., Silchenko, A. N., Popelka, G. R.
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- **Dendritic and Axonal Propagation Delays May Shape Neuronal Networks With Plastic Synapses** *FRONTIERS IN PHYSIOLOGY*
  Asl, M., Valizadeh, A., Tass, P. A.
  2018; 9
- **Dendritic and Axonal Propagation Delays May Shape Neuronal Networks With Plastic Synapses.** *Frontiers in physiology*
  Madadi Asl, M., Valizadeh, A., Tass, P. A.
  2018; 9: 1849
- **Optimal waveform for entrainment of a spiking neuron with minimum stimulating charge** *PHYSICAL REVIEW E*
  Pyragas, K., Fedaravicius, A. P., Pyragiene, T., Tass, P. A.
  2018; 98 (4)
- **Neuronal connectivity in major depressive disorder: a systematic review.** *Neuropsychiatric disease and treatment*
  Helm, K., Viol, K., Weiger, T. M., Tass, P. A., Grefkes, C., Del Monte, D., Schiepek, G.
  2018; 14: 2715-2737
- **Propagation delays determine neuronal activity and synaptic connectivity patterns emerging in plastic neuronal networks.** *Chaos (Woodbury, N.Y.)*
  Madadi Asl, M., Valizadeh, A., Tass, P. A.
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- **Propagation delays determine neuronal activity and synaptic connectivity patterns emerging in plastic neuronal networks** *CHAOS*

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- **Periodic flashing coordinated reset stimulation paradigm reduces sensitivity to ON and OFF period durations** *PLOS ONE*
  Tyulmankov, D., Tass, P. A., Bokil, H.
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- **Delay-Induced Multistability and Loop Formation in Neuronal Networks with Spike-Timing-Dependent Plasticity** *SCIENTIFIC REPORTS*
  Asl, M., Valizadeh, A., Tass, P. A.
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- **Computationally Developed Sham Stimulation Protocol for Multichannel Desynchronizing Stimulation** *FRONTIERS IN PHYSIOLOGY*
  Zeitler, M., Tass, P. A.
  2018; 9: 512
- **How stimulation frequency and intensity impact on the long-lasting effects of coordinated reset stimulation** *PLOS COMPUTATIONAL BIOLOGY*
  Manos, T., Zeitler, M., Tass, P. A.
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- **Short-Term Dosage Regimen for Stimulation-Induced Long-Lasting Desynchronization** *FRONTIERS IN PHYSIOLOGY*
  Manos, T., Zeitler, M., Tass, P. A.
  2018; 9: 376
- **Multisite Delayed Feedback for Electrical Brain Stimulation** *FRONTIERS IN PHYSIOLOGY*
  Popovych, O. V., Tass, P. A.
  2018; 9: 46
- **Letter: Electric Beats Open New Frontiers for Deep Brain Stimulation** *NEUROSURGERY*
  Halpern, C. H., Miller, K. J., Wu, H., Tass, P. A.
  2018; 82 (1): E19–E20
- **Letter: Electric Beats Open New Frontiers for Deep Brain Stimulation.** *Neurosurgery*
  Halpern, C. H., Miller, K. J., Wu, H., Tass, P. A.
  2018; 82 (1): E19-E20
- **Neuronal connectivity in major depressive disorder: a systematic review** *NEUROPSYCHIATRIC DISEASE AND TREATMENT*
  Helm, K., Viol, K., Weiger, T. M., Tass, P. A., Grefkes, C., del Monte, D., Schiepek, G.
  2018; 14: 2715–37
- **Coordinated Reset Vibrotactile Stimulation Shows Prolonged Improvement in Parkinson's Disease** *MOVEMENT DISORDERS*
  Syrkin-Nikolau, J., Neuville, R., O'Day, J., Anidi, C., Koop, M., Martin, T., Tass, P. A., Bronte-Stewart, H.
  2018; 33 (1): 179–80
- **Closed-loop deep brain stimulation by pulsatile delayed feedback with increased gap between pulse phases** *SCIENTIFIC REPORTS*
  Popovych, O. V., Lysyansky, B., Tass, P. A.
  2017; 7
- **Pulsatile desynchronizing delayed feedback for closed-loop deep brain stimulation** *PLOS ONE*
  Popovych, O. V., Lysyansky, B., Rosenblum, M., Pikovsky, A., Tass, P. A.
  2017; 12 (3): e0173363
- **Acute effects and after-effects of acoustic coordinated reset neuromodulation in patients with chronic subjective tinnitus.** *NeuroImage. Clinical*
  Adamchic, I. n., Toth, T. n., Hauptmann, C. n., Walger, M. n., Langguth, B. n., Klingmann, I. n., Tass, P. A.
  2017; 15: 541–58
- **Sensorimotor rhythm neurofeedback as adjunct therapy for Parkinson's disease.** *Annals of clinical and translational neurology*
  Philippens, I. H., Wubben, J. A., Vanwersch, R. A., Estevao, D. L., Tass, P. A.
  2017; 4 (8): 585–90

- **Vibrotactile Coordinated Reset Stimulation for the Treatment of Neurological Diseases: Concepts and Device Specifications.** *Cureus*
  Tass, P. A.
  2017; 9 (8): e1535
- **Dendritic and Axonal Propagation Delays Determine Emergent Structures of Neuronal Networks with Plastic Synapses** *Scientific Reports*
  Madadi Asl, M., Valizadeh, A., Tass, P. A.
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- **Validation of a Mobile Device for Acoustic Coordinated Reset Neuromodulation Tinnitus Therapy** *JOURNAL OF THE AMERICAN ACADEMY OF AUDIOLOGY*
  Hauptmann, C., Wegener, A., Poppe, H., Williams, M., Popelka, G., Tass, P. A.
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- **Capacitive Feedthroughs for Medical Implants** *FRONTIERS IN NEUROSCIENCE*
  Grob, S., Tass, P. A., Hauptmann, C.
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- **Anti-kindling Induced by Two-Stage Coordinated Reset Stimulation with Weak Onset Intensity** *FRONTIERS IN COMPUTATIONAL NEUROSCIENCE*
  Zeitler, M., Tass, P. A.
  2016; 10
- **Noise-enhanced coupling between two oscillators with long-term plasticity** *PHYSICAL REVIEW E*
  Luecken, L., Popovych, O. V., Tass, P. A., Yanchuk, S.
  2016; 93 (3)
- **SUPPRESSION OF SPONTANEOUS OSCILLATIONS IN HIGH- FREQUENCY STIMULATED NEURON MODELS** *LITHUANIAN JOURNAL OF PHYSICS*
  Pyragas, K., Tass, P. A.
  2016; 56 (4): 223-238
- **The Spacing Principle for Unlearning Abnormal Neuronal Synchrony** *PLOS ONE*
  Popovych, O. V., Xenakis, M. N., Tass, P. A.
  2015; 10 (2)
- **Maladaptive neual synchrony in tinnitus: origin and restoration** *FRONTIERS IN NEUROLOGY*
  Eggermont, J. J., Tass, P. A.
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- **Mathematical modeling of chemotaxis and glial scarring around implanted electrodes** *NEW JOURNAL OF PHYSICS*
  Silchenko, A. N., Tass, P. A.
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- **Acoustic Coordinated Reset Neuromodulation in a Real Life Patient Population with Chronic Tonal Tinnitus.** *BioMed research international*
  Hauptmann, C., Ströbel, A., Williams, M., Patel, N., Wurzer, H., von Stackelberg, T., Brinkmann, U., Langguth, B., Tass, P. A.
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- **Augmented brain function by coordinated reset stimulation with slowly varying sequences.** *Frontiers in systems neuroscience*
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  Hauptmann, C., Stroebel, A., Williams, M., Patel, N., Wurzer, H., von Stackelberg, T., Brinkmann, U., Langguth, B., Tass, P. A.
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- **Coordinated reset stimulation in a large-scale model of the STN-GPe circuit** *FRONTIERS IN COMPUTATIONAL NEUROSCIENCE*
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- **Coordinated Reset Neuromodulation for Parkinson's Disease: Proof-of-Concept Study** *MOVEMENT DISORDERS*
  Adamchic, I., Hauptmann, C., Barnikol, U., Pawelczyk, N., Popovych, O., Barnikol, T., Silchenko, A., Volkmann, J., Deuschl, G., Meissner, W. G., Maarouf, M., Sturm, V., Freund, et al
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- **Abnormal cross-frequency coupling in the tinnitus network** *FRONTIERS IN NEUROSCIENCE*
  Adamchic, I., Langguth, B., Hauptmann, C., Tass, P. A.
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- **Reversing pathologically increased EEG power by acoustic coordinated reset neuromodulation** *HUMAN BRAIN MAPPING*
  Adamchic, I., Toth, T., Hauptmann, C., Tass, P.
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- **Control of abnormal synchronization in neurological disorders** *FRONTIERS IN NEUROLOGY*
  Popovych, O., Tass, P. A.
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  Popovych, O. V., Tass, P. A.
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- **Mechanism of suppression of sustained neuronal spiking under high-frequency stimulation** *BIOLOGICAL CYBERNETICS*
  Pyragas, K., Novicenko, V., Tass, P.
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- **Self-organized noise resistance of oscillatory neural networks with spike timing-dependent plasticity** *SCIENTIFIC REPORTS*
  Popovych, O. V., Yanchuk, S., Tass, P. A.
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- **Computational modeling of chemotactic signaling and aggregation of microglia around implantation site during deep brain stimulation** *EUROPEAN PHYSICAL JOURNAL-SPECIAL TOPICS*
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- **Impact of acoustic coordinated reset neuromodulation on effective connectivity in a neural network of phantom sound** *NEUROIMAGE*
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- **Neuromodulation: selected approaches and challenges** *JOURNAL OF NEUROCHEMISTRY*
  Parpura, V., Silva, G. A., Tass, P. A., Bennet, K. E., Meyyappan, M., Koehne, J., Lee, K. H., Andrews, R. J.
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- **Rebuttal to reply by G. Rucker and G. Antes on Tass et al. "Counteracting tinnitus by acoustic coordinated reset neuromodulation", Restorative Neurology and Neuroscience Vol. 30(2), 2012** *RESTORATIVE NEUROLOGY AND NEUROSCIENCE*
  Tass, P. A., Adamchic, I., Freund, H., von Stackelberg, T., Hauptmann, C.
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  Lysyansky, B., Popovych, O., Tass, P. A.
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- **Coordinated reset has sustained aftereffects in Parkinsonian monkeys** *ANNALS OF NEUROLOGY*
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  Adamchic, I., Tass, P., Langguth, B., Hauptmann, C., Koller, M., Schecklmann, M., Zeman, F., Landgrebe, M.
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- **Desynchronizing electrical and sensory coordinated reset neuromodulation** *FRONTIERS IN HUMAN NEUROSCIENCE*
  Popovych, O. V., Tass, P. A.
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- **Unlearning tinnitus-related cerebral synchrony with acoustic coordinated reset stimulation: theoretical concept and modelling** *BIOLOGICAL CYBERNETICS*
  Tass, P. A., Popovych, O. V.
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- **Changes of oscillatory activity in pitch processing network and related tinnitus relief induced by acoustic CR neuromodulation** *FRONTIERS IN SYSTEMS NEUROSCIENCE*
  Adamchic, L., Hauptmann, C., Tass, P. A.
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  Popovych, O. V., Yanchuk, S., Tass, P. A.
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