ICMNS 2019

June 24-26

COPENHAGEN

PROGRAMME

DET NATUR- OG BIOVIDENSKABELIGE FAKULTET
KØBENHAVNS UNIVERSITET

Springer

Springer

ESMTB
European Society for Mathematical and Theoretical Biology

CARISBERG FOUNDATION

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Notebook

General info

Venue

The conference venue is in the *North Campus* of the University of Copenhagen.

Scientific programme

The scientific programme will be held at the *Biocenter*.

Address: *Biocenter*
Ole Maaløes Vej 5
2200 Copenhagen N

Plenary talks will take place in the *Lundbeck Auditorium*, parallel talks will take place in the Lundbeck Auditorium and in *Room 4-0-24*. The poster session will be hosted right next to the Lundbeck Auditorium.

Lunches

Lunch will be served in the cafeteria in the Biocenter.

Welcome reception

The Welcome reception on Monday at 17:00 will be hosted at the *H. C. Ørsted Institute* in the south end of the main hall on the ground floor.

Address: *H. C. Ørsted Institute*
Universitetsparken 5
2100 Copenhagen Ø

The H. C. Ørsted Institute is located in the North Campus of the University of Copenhagen and is within a 5 minutes walk from the Biocenter.

Conference dinner

The conference dinner will be held at *Nørrebro Bryghus*, approximately 1.5 km away from the conference venue in the direction towards the city centre.

Address: *Nørrebro Bryghus*
Ryesgade 3
2200 Copenhagen N

Name badge

Please keep your name badge with you at all times during the conference. Your badge is your ticket for lunch and for the conference dinner.

Internet

The University of Copenhagen is covered by *Eduroam* and by *KU Guest* wireless networks.

Eduroam
You can log on if you already have access to Eduroam from your home university.

KU Guest

1. Log on to the wireless network "KU Guest".
2. Open a browser and follow the on-screen instructions.
3. You should receive an e-mail and a text message with the password. The account will work for 24 hours.

Useful phone numbers

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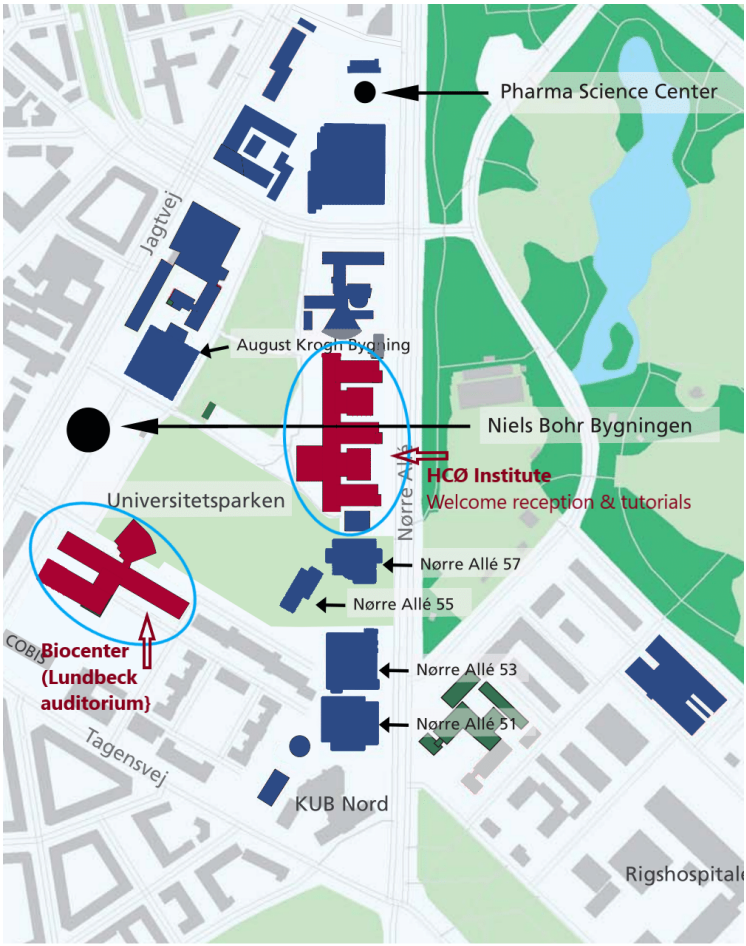
Emergency: 112

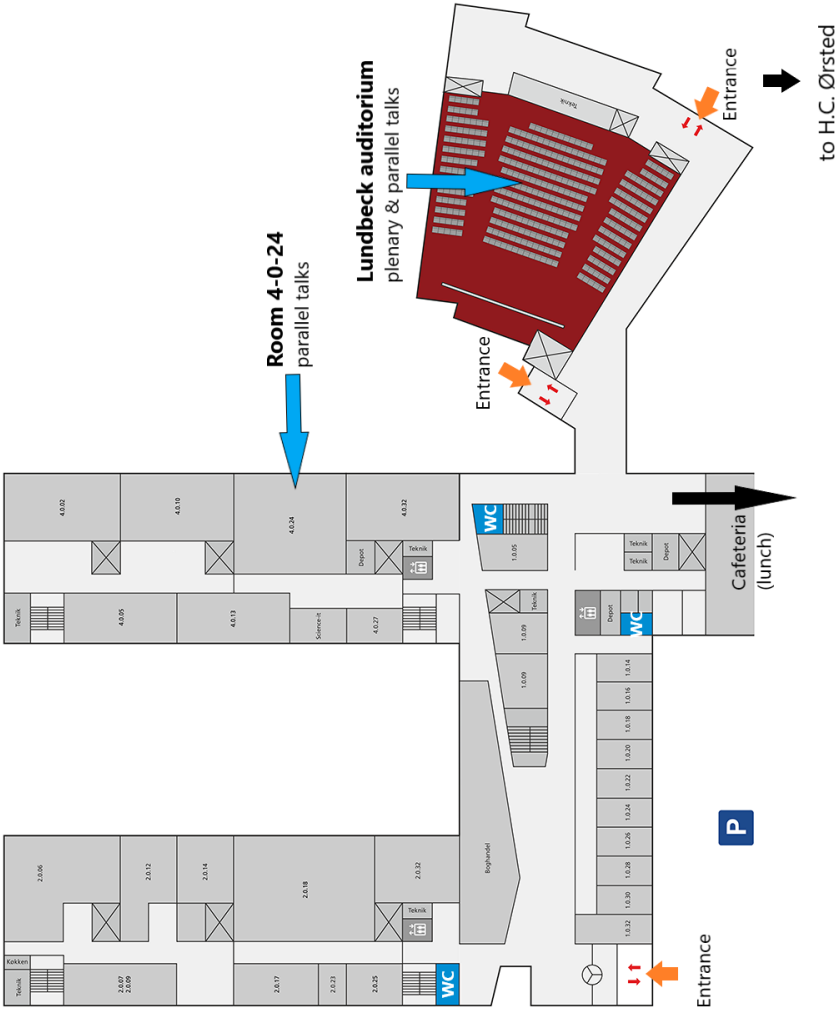
For more information and abstracts visit the conference website:

`http://web.math.ku.dk/~susanne/ICMNS2019/`

Maps

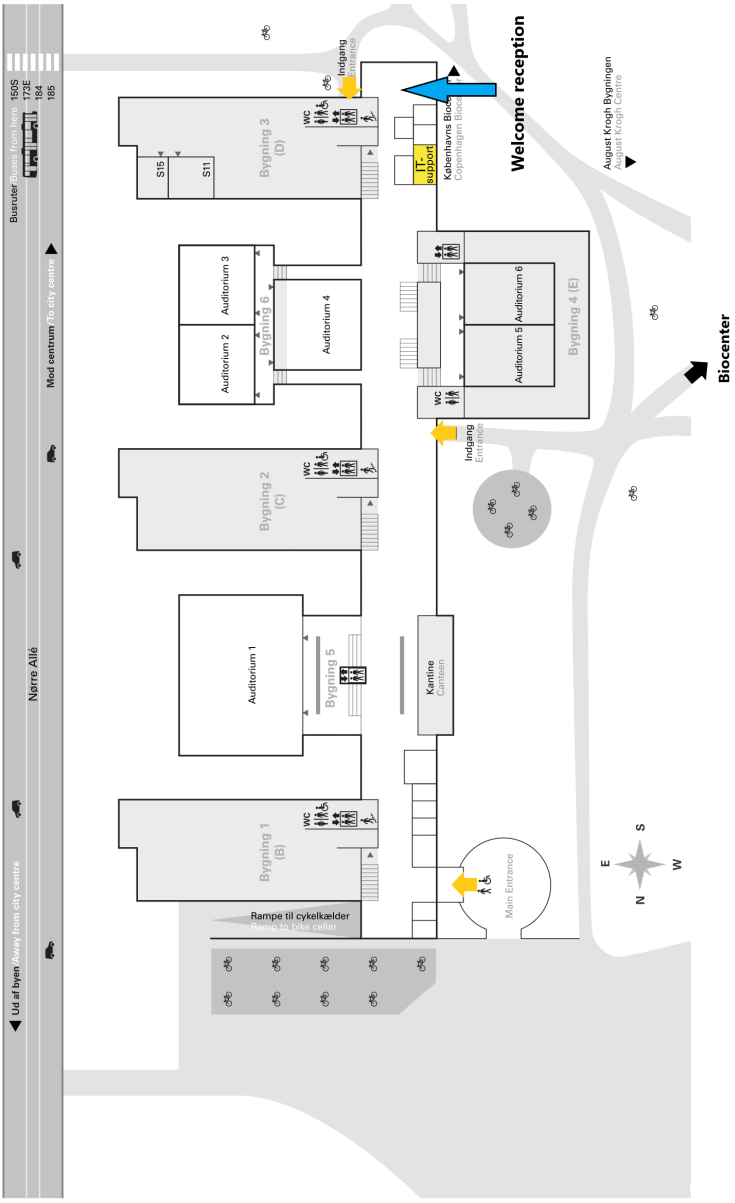


UCPH North Campus



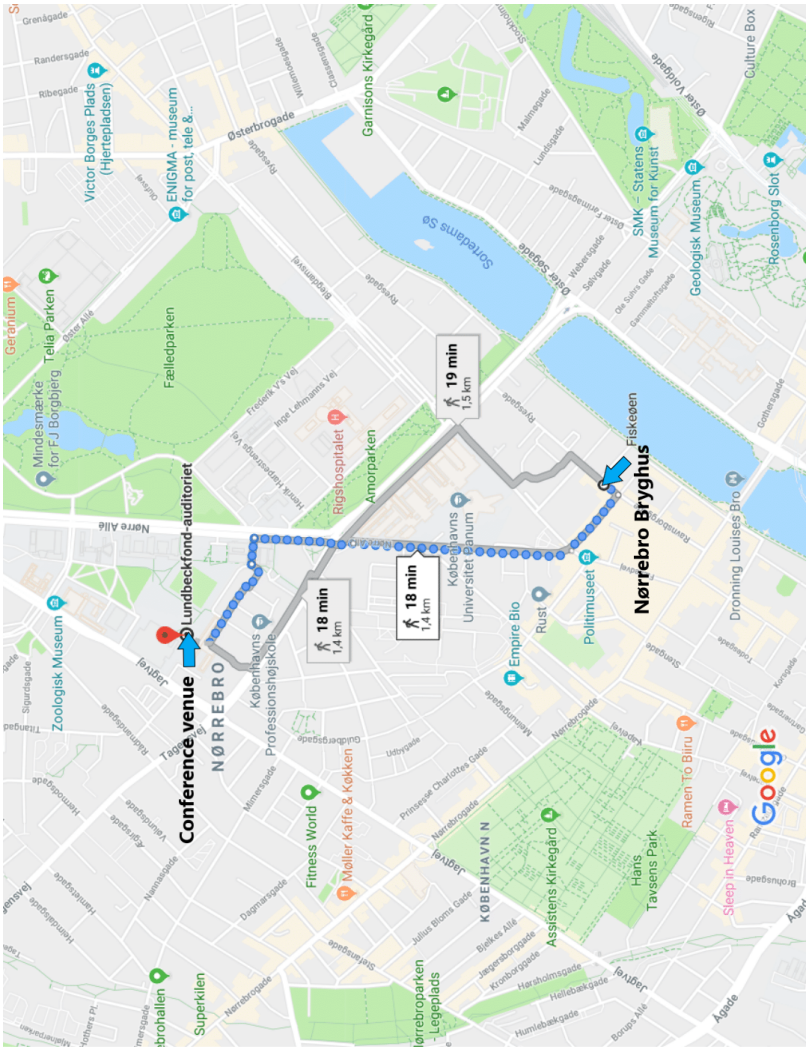
Biocenter

Ole Maaløes Vej 5, ground floor



H. C. Ørsted Institute

Universitetsparken 5, ground floor



Conference dinner

Nørrebro Bryghus, Ryesgade 3

Programme

Programme overview

	Monday June 24	Tuesday June 25	Wednesday June 26
08:45-09:00	Welcome		
09:00-10:30	Plenary talks	Plenary talks	Plenary talks
10:30-11:00	Coffee break	Coffee break	Coffee break
11:00-12:35	Parallel talks	Parallel talks	Parallel talks
12:35-14:00	Lunch	Lunch	Lunch
14:00-15:35	Parallel talks	Poster session	Poster prize & parallel talks
15:35-16:00	Coffee break	Coffee break	Coffee break
16:00-17:00	Plenary talks	Plenary talks	Plenary talks
17:00-19:00	Welcome reception		Closing remarks
18:00-22:00		Conference dinner	

Monday, June 24

08:45-10:30	**Plenary session** (Lundbeck auditorium) *Chair: Andre Longtin*	
08:45-09:00	Opening remarks	
09:00-10:00	Keynote lecture Nicolas Brunel *Fixed point attractors, chaos and sequences in networks with unsupervised Hebbian plasticity rules*	
10:00-10:30	Carina Curto *Dynamically relevant motifs in inhibition-dominated networks*	
10:30-11:00	Coffee break	
11:00-12:35	**Parallel session I** (Lundbeck auditorium) *Chair: Erik Martens*	**Parallel session II** (Room 4-0-24) *Chair: Massimiliano Tamborrino*
11:00-11:20	Emilie Soret *Asymptotic behaviour of a network of neurons with random linear interactions*	Alexandre Melanson *Data-driven estimation of drift-diffusion-jump neural processes*
11:25-11:45	Romain Veltz *Dynamics of a mean field limit of interacting 2D nonlinear stochastic spiking neurons*	Antoni Guillamon *A computational strategy to estimate synaptic conductances in spiking regimes*
11:50-12:10	Samuel Muscinelli *Shaping chaotic dynamics and signal transmission by single neuron properties in random neural networks*	Ryota Kobayashi *A method for estimating synaptic connections from parallel spike trains*
12:15-12:35	Tilo Schwalger *Hazard rate approach to spiking neural networks with background noise*	Laura Sacerdote *Copulas and shuffles as statistical tools to recognize hidden dependences between neurons stimulated by periodic signals*
12:35-14:00	Lunch	

14:00-15:35	**Parallel session I** (Lundbeck auditorium) *Chair: Antoni Guillamon*	**Parallel session II** (Room 4-0-24) *Chair: Jacob Østergaard*
14:00-14:20	James MacLaurin *Wandering bumps in a stochastic neural field: a variational approach*	Lubomir Kostal *Coordinate invariance as a constraint on the mutual information decomposition*
14:25-14:45	Daniele Avitabile *This is not a bump*	Zachary Kilpatrick *Optimal evidence accumulation on social networks*
14:50-15:10	Priscilla Greenwood *Stochastic neural field with smoothed noise*	Roberto Barrio *Insect movement gaits: neuron model, CPG and pattern bifurcations*
15:15-15:35	Stephen Coombes *Pattern formation in biological neural networks with rebound currents*	Antonio E Teruel *Annihilation phenomenon in a PWL version of the FitzHugh-Nagumo system*
15:35-16:00	Coffee break	
16:00-17:00	**Plenary session** (Lundbeck auditorium) *Chair: Susanne Ditlevsen*	
16:00-16:30	Anton M. Unakafov *Strategies used by humans and monkeys in transparent coordination games*	
16:30-17:00	Guillaume Lajoie *Learning to control muscles with a brain-computer interface: a hierarchical and adaptive algorithm to optimally explore neural maps*	
17:00-19:00	**Welcome reception** (H. C. Ørsted Institute)	

Tuesday, June 25

09:00-10:30	**Plenary session** (Lundbeck auditorium) *Chair: Susanne Ditlevsen*	
09:00-10:00	Keynote lecture Stefan Treue *TBA*	
10:00-10:30	Rachel Nicks *Clusters in nonsmooth oscillator networks*	
10:30-11:00	Coffee break	
11:00-12:35	**Parallel session I** (Lundbeck auditorium) *Chair: Eva Löcherbach*	**Parallel session II** (Room 4-0-24) *Chair: Laura Sacerdote*
11:00-11:20	Yoram Baram *Circuit Polarity Effect of Cortical Connectivity, Activity and Memory*	Skirmantas Janusonis *Quantitative Analysis of Stochastic Axon Systems*
11:25-11:45	Rodica Curtu *Using dynamic neural fields to examine loci of plasticity in supervised and unsupervised auditory category learning*	Victor Matveev *Accuracy of Mass-Action vs Stochastic Modeling of Calcium-Dependent Vesicle Release*
11:50-12:10	Henrik Ekström *Percolation on dynamical random graphs provides a model for defining synaptic connections*	Nataliya Kraynyukova *The impact of mRNA localization on dendritic protein distribution and its dynamics*
12:15-12:35	Leonid Rubchinsky *Spike-timing-dependent plasticity effect on the patterns of neural synchrony*	Massimiliano Tamborrino *Shot Noise, diffusion limits and suitable approximations*
12:35-13:45	Lunch	

13:45-14:00	Group photo
14:00-15:35	**Poster session**
15:35-16:00	Coffee break
16:00-17:00	**Plenary session** (Lundbeck auditorium) *Chair: Wilhelm Stannat*
16:00-16:30	Katie Morrison *Emergent sequences from recurrent network motifs*
16:30-17:00	Peter Thomas *Dissecting Molecular Contributions to Interspike Interval Variability in Conductance-Based Neural Models via Stochastic Shielding*

18:00-22:00	**Conference dinner at Nørrebro Bryghus**

Wednesday, June 26

09:00-10:30	**Plenary session** (Lundbeck auditorium) *Chair: Wilhelm Stannat*	
09:00-10:00	Keynote lecture Eva Löcherbach *Short term plasticity and short term memory in systems of spiking neurons*	
10:00-10:30	Diego Vidaurre *Characterising the temporal dynamics of stimulus processing through unconstrained decoding*	
10:30-11:00	Coffee break	
11:00-12:35	**Parallel session I** (Lundbeck auditorium) *Chair: Patricia Reynaud-Bouret*	**Parallel session II** (Room 4-0-24) *Chair: Marie Levakova*
11:00-11:20	Angelo Di Garbo *Firing properties of a resonate-and-fire neural model with periodic forcing and noise*	Mustafa Zeki *Communication Between Time Cells Leads to the Linear Increase of Noise*
11:25-11:45	Bastian Pietras *Neuronal firing rate models with electrical and chemical synapses*	Gemma Huguet *Mathematical tools for phase control and their role in neural communication*
11:50-12:10	Anca Radulescu *Predicting dynamics from hardwiring in canonical low-dimensional coupled networks*	Zachary Kilpatrick *Analyzing dynamic decision models using differential Chapman-Kolmogorov equations*
12:15-12:35	Aine Byrne *A neural circuit model for learning a beat*	Rune Berg *Sparse network connectivity revealed from physiology: What pairwise intracellular recordings can tell us about motor circuits*
12:35-14:00	Lunch	

14:00-14:20	Poster prize	
14:25-15:35	**Parallel session I** (Lundbeck auditorium) *Chair: Rodica Curtu*	**Parallel session II** (Room 4-0-24) *Chair: Erik Martens*
14:25-14:45	Fabian Pallasdies *Synfire Chain-Like Activity Underlies Swimming and Turning of the Scyphozoan Jellyfish Aurelia aurita*	Bulcsu Sandor *The mathematics of self-organized neurobots*
14:50-15:10	Matias Calderini *Slow coordinated fluctuations in neural activity in a balanced cortical network*	Manu Kalia *A biophysical model for the tripartite synapse under metabolic stress*
15:15-15:35	Selma Souihel *Anticipation in the retina and the primary visual cortex: towards an integrated retino-cortical model for motion processing*	
15:35-16:00	Coffee break	
16:00-17:00	**Plenary session** (Lundbeck auditorium) *Chair: Andre Longtin*	
16:00-16:30	Kenneth Harris *High-dimensional geometry of population responses in visual cortex*	
16:30-17:00	James Rankin *Periodic forcing of auditory bistability: modelling and experiments*	
17:00	Closing remarks	

Posters

1. S. Goedeke, F. Y. K. Kossio, R.-M. Memmesheimer
   The cluster duration distribution of Hawkes processes

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2. R. Naud, A. Longtin
   Stochastic spike-diffuse-spike model of propagation in randomly demyelinated nerves

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3. P. Helson, E. Tanré, R. Veltz
   A mathematical analysis of memory lifetime in a simple network model of memory

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4. F. Darki, J. Rankin
   Mixed-mode oscillations and chaotic dynamics in a model of rivalry

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5. Q. Cormier, E. Tanré, R. Veltz
   Long time behavior of a mean-field model of interacting neurons

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6. E. Camacho, A. Radulescu, Stephen Wirkus
   Bifurcation analysis of a photoreceptor interaction model for Retinitis Pigmentosa

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7. G. D'Onofrio, P. Lansky, M. Tamborrino
   On diffusion neuronal models with multiplicative noise

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8. M. Forrester, R. O'Dea, S. Coombes, J. Crofts
   TMS-induced synchronisation in human brain networks

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9. P. Lima, D. Avitabile, S. Coombes
   Numerical investigation of a neural field model including dendritic processing

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10. L. Pérez, R. Barrio, S. Ibáñez
Homoclinic organization in fold/hom bursters: the Hindmarsh-Rose model

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11. A. Meddah
Mathematical modelling of low grade glioma diffusion

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12. E. Baspinar, G. Citti, A. Sarti
A sub-Riemannian model of the visual cortex based on frequency-phase and its applications

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13. A. Radulescu, C. Williams, A. Scimemi
Geometry-based estimates of glutamate transporter density in astrocytes

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14. B. Jüttner
Chimera states in two-population network of theta-neurons

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15. D. Todorov, Wilson Truccolo
Runaway excitation-like behavior in networks of PPGLM-type spiking neurons

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16. S. Petros, D. Avitabile, S. Coombes, S. Sotiropoulos, P. Houston
The Numerical solution of neural field models posed on realistic cortical domains

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17. V. Schmutz, W. Gerstner, T. Schwalger
Mesoscopic population equations for spiking neural networks with synaptic short-term plasticity

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18. G. Ascione, E. Pirozzi, B. Toaldo
Exit time of semi-Markov processes and neuronal models

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19. A. Cocks, S. Coombes, A. Johnston, D. Avitabile
Understanding sensory induced hallucinations: From neural fields to amplitude equations

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Posters

20. E. Boschin, J. M. Galeazzi, M. Ainsworth, M. O'Neill, M. J. Buckley
Predictive coding and behavioural flexibility during probabilistic decision-making: multi-neuronal, multi-area, electrophysiological investigations of the macaque prefrontal cortex

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21. K. Sawada, Y. Shimada, T. Ikeguchi
Estimation of connections between neurons only from inter-spike-interval

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22. I. Tubikanec, M. Tamborrino, E. Buckwar
Spectral density-based and structure-preserving Approximate Bayesian Computation for partially observed SDEs with an invariant measure: A demonstration on the Jansen and Rit neural mass model and the FitzHugh-Nagumo Model

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23. E. Buckwar, M. Ouafoudi
Stochastic approach to the modeling of sweet taste signaling

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24. N. Schieferstein, R. Kempter
Towards a reduced model of ripple oscillations in recurrent inhibitory networks

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25. C. Langdon, K. Morrison, C. Curto
Threshold-linear networks and mutations of oriented matroids

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26. N. Miya, Y. Shimada, K. Fujiwara, T. Ikeguchi
Effects of excitatory/inhibitory neuron ratio on neural activities and network structures

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27. Y. E. Rodrigues, H. Marie, C. O'Donnell, Romain Veltz
A stochastic model of postsynaptic plasticity based on dendritic spine Ca^{2+} downstream proteins

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28. S. A. Campbell, M. Chugunova
Application of the mathematical model for autocrine regulation with diffusive signalling agent to GnRH neurons synchronization

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29. W. Wojtak, E. Bicho, W. Erlhagen
Neural field model of matching law behavior

30. C. Zucca, A. Civallero, L. Sacerdote
The two compartment leaky integrate-and-fire neuronal model related to a one compartment integrate-and-fire model and the Gamma renewal process

31. L. Lemaire, M. Desroches, O. Faugeras, M. Krupa, M. Mantegazza
Modeling the initiation of cortical spreading depression triggered by the hyperactivity of GABAergic neurons

32. J. Kobbersmed, A. Grasskamp, A. Walter, S. Ditlevsen, J. B. Sørensen
Stochastic simulation of synaptic facilitation in Drosophila neuromuscular junction

33. Y. Wang, J. Gill, H. Chiel, P. Thomas
Shape versus timing: linear responses of a limit cycle with hard boundaries under instantaneous and static perturbation

34. M. Schünemann, U. Ernst, M. Keßeböhmer
Exact avalanche distributions for inhomogeneous networks of non-leaky integrate and fire neurons

35. M. B. Raad, S. Ditlevsen, E. Löcherbach
Age Dependent Hawkes Process

36. O. Brandibur, E. Kaslik
Fractional-order versions of neuronal models

37. E.-A. Kokovics, E. Kaslik, A. Radulescu
Wilson-Cowan neuronal interaction models with distributed delays

List of participants

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Blake Cook	University of Exeter
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Weronika Wojtak	University of Minho
Mustafa Zeki	American University of the Middle East
Cristina Zucca	University of Torino

Committees

Conference Chairs

- *André Longtin* (University of Ottawa, Canada)
- *Wilhelm Stannat* (Technische Universität Berlin, Germany)
- *Susanne Ditlevsen* (University of Copenhagen, Denmark) - general chair

Scientific Committee

- *Daniele Avitabile* (University of Nottingham, UK)
- *Toni Guillamon* (Universitat Politècnica de Catalunya, Spain)
- *Kresimir Josic* (University of Houston, USA)
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- *Martin Wechselberger* (University of Sydney, Australia)
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- *Lubomir Kostal* (Institute of Physiology, Czech Republic)
- *Patricia Reynaud Bouret* (Université Nice, France)
- *Alex Roxin* (CRM Barcelona, Spain)
- *Laura Sacerdote* (University of Torino, Italy)
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- *Tatyana Turova* (Lund University, Sweden)
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- *Robert Rosenbaum* (Université of Notre Dame, USA)
- *Romain Veltz* (Inria Sophia Antipolis, France)
- *Etienne Tanré* (Inria Sophia Antipolis, France)
- *Bard Ermentrout* (University of Pittsburgh, USA)

Organizing Committee

Jacob Østergaard, Erik Andreas Martens, Marie Levakova, Susanne Ditlevsen

Notebook