

Thematic program

« Mathematical modeling of organization in living matter »

Paris, January 10th – April 1st, 2022

Workshop on Mathematical Modeling and Statistical Analysis in Neuroscience January 31st - February 4th, 2022

Organizers: Susanne Ditlevsen, Olivier Faugeras, Antonio Galves, Patricia Reynaud-Bouret, Delphine Salort and Shigeru Shinimoto.

 **YouTube** <https://www.youtube.com/c/InstitutHenriPoincar%C3%A9>

Monday January 31st

Opening

9:30 am - 10:30 am Welcoming of participants

10:30 am - 11:30 am

[Guilherme Ost \(P\)](#) / [Claudia Vargas \(Online\)](#) (Federal University of Rio de Janeiro)

Retrieving the structure of probabilistic sequences of auditory stimuli from electroencephalographic (EEG) signals

11:30 am - 12:00 pm

[Shigeru Shinimoto \(Online\)](#) (Kyoto University)

Inferring monosynaptic connections from a cross-correlogram of neuronal spike trains

Lunch

Statistics and Artificial Intelligence Afternoon

02:30 pm - 03:30 pm

[Ingrid Bethus \(P\)](#) and [Alexandre Muzy \(P\)](#) (Université Côte d'Azur)

Linking individually varying behavioral learning to neuronal code using granular computational cognitive models

03:30 pm - 04:00 pm

[Uri Eden \(Online\)](#) (Boston University)

Marked Point Process Modeling and Estimation Problems in Neural Data Analysis

Break

04:30 pm - 05:00 pm

[Thibault Taillefumier \(Online\)](#) (University of Texas)

Neural networks in the replica-mean field limits

05:00 pm - 05:30 pm

[Robert E. Kass \(Online\)](#) (Carnegie Mellon University) (*attente horaire*)

Statistical Models of Interaction Across Brain Regions from Multi-Electrode Recordings

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Tuesday February 1st

Statistics and Artificial Intelligence: the morning session animated by Ingrid Bethus and Alexandre Muzy (Université Côte d'Azur)

10:00 am - 10:20 am

[Flavio Rusch](#) (P) (Sao Paulo)

Self-organized criticality in hierarchical modular networks of Galves-Löcherbach neurons

10:20 am - 10:40 am

[Tien Cuong Phi](#) (P) (Université Côte d'Azur)

A new method to simulate point processes

10:40 am - 11:00 am

[Antonio Carlos Costa](#) (P) (Amsterdam)

Maximally predictive ensemble dynamics from data

11:00 am - 12:00 pm Discussion

Lunch

Algebra and Geometry Afternoon

02:30 pm - 03:00 pm

[Claire Guerrier](#) (Online) (Université Côte d'Azur)

Multi-scale modeling of vesicular release at neuronal synapses

03:00 pm - 03:30 pm

[Carina Curto](#) (P) (Pennsylvania State University)

Graph rules and topological insights for inhibitory network dynamics

Break

04:30 pm - 05:30 pm

[Lida Kanari](#) (Online) and [Kathryn Hess](#) (Online) (EPFL)

Topological insights on neuronal morphologies

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Wednesday February 2nd

Algebra and Geometry: the morning session animated by Lida Kanari and Kathryn Hess (EPFL)

10:00 am -10:20 am

[Yuri Rodrigues \(P\)](#) (Université Côte d'Azur)

A new synaptic rule to unify experimental heterogeneity

10:20 am -10:40 am

[Sunil Modhara \(Online\)](#) (Nottingham)

Neural fields with rebound currents: novel routes to patterning

10:40 am -11:00 am

[Alejandro Ramos Lora \(P\)](#) (Granada)

Beyond Blow-Up for Nonlinear Noisy Leaky Integrate and Fire neuronal models: numerical approach to the "plateau" state

11:00 am -12:00 pm Discussion

Lunch

Probability Afternoon

02:30 pm - 03:30 pm

[Eva Löcherbach \(P\)](#) (Université Panthéon Sorbonne) - [Christophe Pouzat \(P\)](#)

(Université de Strasbourg)

System of interacting neurons with short term synaptic facilitation

03:30 pm - 04:00 pm

[Etienne Tanré \(P\)](#) (Inria Sophia-Antipolis)

Spontaneous oscillations in a pure excitatory mean field networks of neurons

Break

04:30 pm - 05:00 pm

[Wilhem Stannat \(Online\)](#) (TU Berlin)

Fluctuation limits for mean-field interacting nonlinear Hawkes processes

05:00 pm - 05:30 pm

[Romain Veltz \(Online\)](#) (Inria Sophia Antipolis)

Some recent results on a mean field of a network of 2d spiking neurons.

Thursday February 3rd

Probability: the morning session animated by Eva Löcherbach (Université Panthéon Sorbonne) and Christophe Pouzat (Université de Strasbourg)

10:00 am - 10:20 am

[Morgan André \(P\)](#) (UniCamp and NeuroMat)

Time averages of a metastable system of spiking neurons

10:20 am - 10:40 am

[Luyan Yu \(Online\)](#) (University of Texas)

Metastable spiking networks in the replica-mean-field limit

10:40 am - 11:00 am

[Michel Davydov \(P\)](#) (ENS Paris – Inria)

Propagation of Chaos and Poisson Hypothesis for Replica Mean-Field Models

11:00 am -12:00 pm Discussion

Lunch

PDE and Dynamical systems Afternoon

02:30 pm - 03:30 pm

[Afia Ali \(Online\)](#) (UCL) and [Mathieu Desroches \(Online\)](#) (Inria Sophia-Antipolis)

Understanding Synaptic Mechanisms: Why a Multi-disciplinary Approach is Important ?

03:30 pm - 04:00 pm

[Daniele Avitabile \(P\)](#) (Vrije Universiteit Amsterdam)

Projection methods for spatially-extended neurobiological models

Break

04:30 pm - 05:00 pm

[Grégory Faye \(Online\)](#) (Université Paul Sabatier Toulouse)

Front initiation in continuous neural fields

05:00 pm - 05:30 pm

[José A. Carillo \(P\)](#) (Oxford)

Noise-driven bifurcations in a neural field system modelling networks of grid cells

05:30 pm - 06:00 pm

[Bruno Cessac \(Online\)](#) (Inria Sophia-Antipolis)

The non linear dynamics of retinal waves

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Friday February 4th

PDE and Dynamical systems: the morning session animated by Afia Ali (UCL) and Mathieu Desroches (Inria Sophia-Antipolis)

10:00 am - 10:20 am

[Zhennan Zhou](#) (Online) (Peking University)

Towards understanding the time periodic solutions in a kinetic model for neuron networks

10:20 am - 10:40 am

[Kota Ikeda](#) (Online) (Meiji University)

Theoretical study of the emergence of periodic solutions for the inhibitory NNLIIF neuron model with synaptic delay

10:40 am - 11:00 am

[Nicolas Torres](#) (P) (Sorbonne Université)

A multiple time renewal equation for neural assemblies with elapsed time model

11:00 am - 12:00 pm Discussion

Lunch

Closure

02:30 pm Reward ceremony (MNA)

02:40 pm - 03:40 pm

[Stephen Coombes](#) (Online) and [Peter Liddle](#) (Online) (University of Nottingham)

A neural mass model for abnormal beta-rebound in schizophrenia