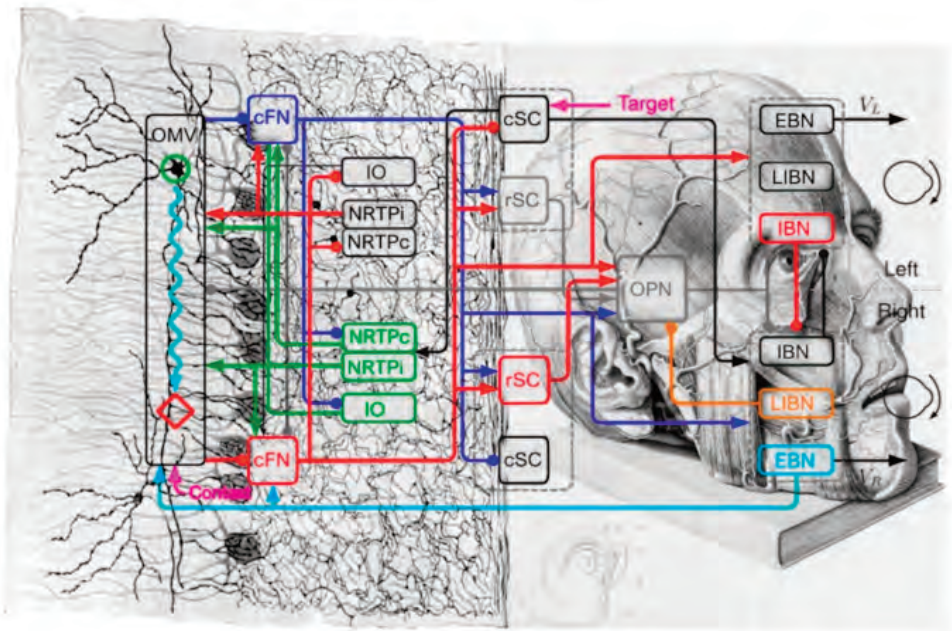

Patronages requested:

Comune di Pavia
Assessorato alla Sanità

Ordine dei Medici Chirurghi
e degli Odontoiatri
della provincia di Pavia

Pavia, 6th-7th-8th June 2018

Mathematical Modeling in Motor Neuroscience.

A short course and scientific meeting

in honor of Lance Optican

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

Understanding sensorimotor systems and neurological disorders through mathematical modeling: we are celebrating Lance Optican's career with a three-day meeting in Pavia, Italy, June 6th – 8th.

In order to stimulate the interest the interdisciplinary field of mathematical modeling applied to both eye movements and other sensorimotor systems we have organized the event based on two programs.

In the mornings, there will be a Short Course with didactic lectures, aimed at introducing more basic and clinical researchers to the use of mathematical models in scientific and clinical investigation. Most lectures will have two teachers: the first will present a mathematical modeling topic and the second will emphasize the implications of the proposed models both in health and disease, presenting interactions between basic physiology and clinical problems.

In the afternoons there will be a more traditional Research Meeting with platform and poster presentations on the various issues related to modeling in the field of motor neuroscience.

With this event we hope to attract a wide audience including students (hopefully some of whom will become future colleagues), postdoctoral fellows and junior scientists, as well as established leaders in our field, both in research and teaching.

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

ORGANIZING COMMITTEE

COMMiMN

Comitato Organizzatore Mathematical Modeling in Motor Neuroscience

Via San Giovanni in Borgo 4 – 27100 Pavia, Italy

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Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

SHORT COURSE

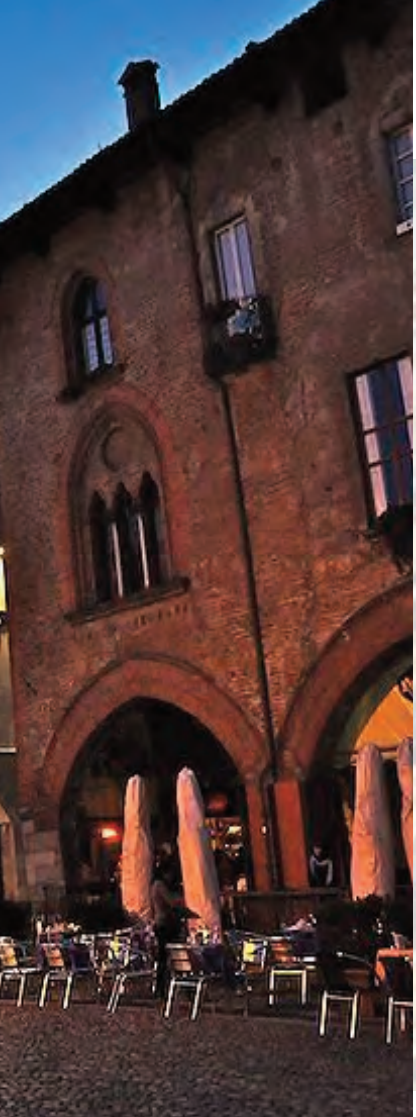
Short Course Topics:

1 From differential equations to linear control systems
2 Closed-loop and non-linear systems
3 State-space equations and learning
4 Integrators and optimal control
5 Bayesian modeling in perception and decision making
6 Maps and sensorimotor transformations
7 Neuromimetic models and oscillations

Confirmed Short Course Speakers:

Engineering: Henrietta Galiana, Stefan Glasauer, Philippe Lefèvre, Daniel Merfeld, John Van Opstal, Lance Optican, Maurice Smith.

Clinical: Joseph L. Demer, R. John Leigh, Janet Rucker, Barry Seemungal, Aasef Shaikh, Dominik Straumann.



Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

Wednesday 6th June 2018 PROGRAM

SHORT COURSE

08.00 Registration
08.15 Institutional Welcome
08.30 Opening Introduction
S. Ramat

From differential equations to linear control systems
08.45 **H. Galiana**
10.00 **D. Straumann**

10.30 *Coffee break*

Closed loop and nonlinear systems.
10.45 **P. Lefèvre**
12.00 **J. L. Demer**

12.30 Closing

12.30-13.00 *Light lunch* (Full Meeting participants only)

The conference venue can be reached by bike, by bus, by shuttle

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

Wednesday 6th June 2018

RESEARCH MEETING

13.30 Registration
14.00 Institutional Welcome
14.15 Opening Introduction
Scientific Committee

I Session

14.30 **Maurice Smith**
New insights into error-dependent motor learning
14.50 **Yoshiko Kojima**
A Neuronal Process for Adaptive Control of Primate Saccadic System.
15.10 **Bernhard Hess**
Ocular torsion in binocular visual matching
15.30 **Joe Demer**
Twisted Implications of Torques for Ocular Motor Modeling
15.50 **Christian Quaia**
Binocular summation for reflexive eye movements:
A diagnostic tool for stereoanomalies
16.10 *Coffee break*

Wednesday 6th June 2018

II Session

16.30 **Stewart Judge**
The dual interactive controller model for control of accommodation and convergence of the eyes: is it useful?

16.50 **Anja Horn**
Extraocular muscles involved in convergence are supplied by an additional set of palisade endings that may differ in their excitability

17.10 **Yoshikazu Shinoda**
Input-output Organization of Omnipause Neurons and their Functional Role in Saccade Generation

17.30 **Barry Richmond**
Using chemogenetic tools (DREADDs) to study reward sensitivity

17.50 **John van Opstal**
Microstimulation in a spiking neural network model of the midbrain superior colliculus elicits normometric saccadic eye movements

18.10 Closing

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

Wednesday 6th June 2018

18.15-19.30 Guided visit. Back to the past: Motor Neuroscience in Pavia

19.30 Welcome cocktail at Broletto Palace, the old City Hall

The Broletto place is the oldest broletto of Lombardy, and it rises on the area occupied once by the Bishop of Pavia, erected in the VIII century.
It was the site of the city administration from the Middle Ages to 1874 when the municipal offices moved to Mezzabarba palace

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

Thursday 7th June 2018 PROGRAM

SHORT COURSE

08.30 Registration

State-space equations and learning

08.45 **M. Smith**

10.00 **A. Shaikh**

10.30 *Coffee break*

Integrators and optimal control

10.45 **D. Merfeld**

11.45 **R. J. Leigh**

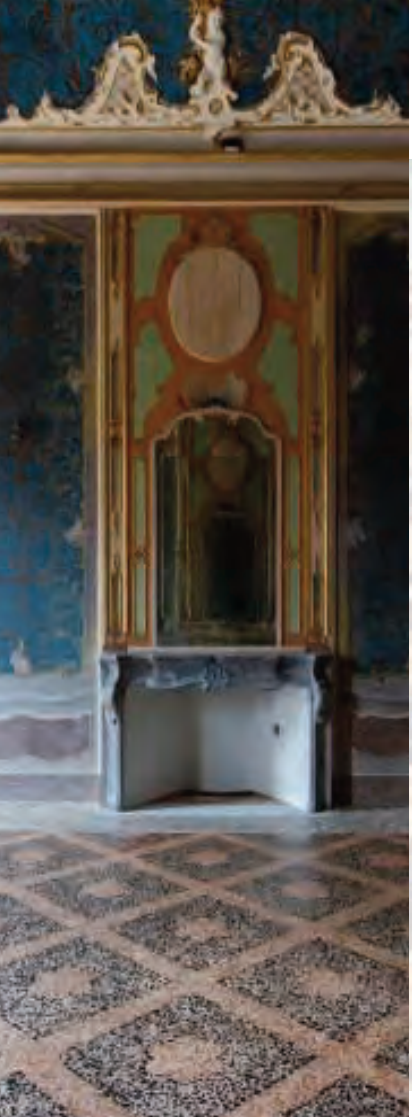
Bayesian modeling in perception and decision-making

12.15 **S. Glasauer**

13.00 Closing

13.00-13.30 *Light lunch* (Full Meeting participants only)

The conference venue can be reached by bike, by bus, by shuttle



Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

Thursday 7th June 2018

RESEARCH MEETING

13.45 Registration

III Session

14.20 **Ji Soo Kim**
Central positional nystagmus: a modeling approach

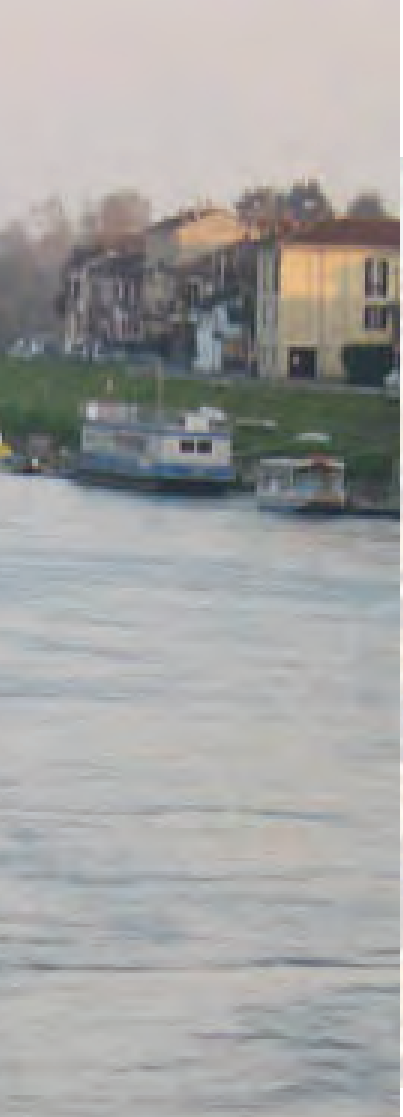
14.40 **Jorge Kattah**
Oculomotor and vestibular correlates in autoimmune and paraneoplastic ataxia syndromes

15.00 **Adolfo Bronstein**
Visual Control of Balance

15.20 **Dan Merfeld**
Natural variations in vestibular perceptual thresholds impact balance in healthy asymptomatic "normal"

15.40 **Stefan Glasauer**
Explaining perceptual signs and symptoms following unilateral lesions of vestibular pathways

16.00 *Coffee break*



Thursday 7th June 2018

IV Session

16.20 **Alessandra Rufa**
The cerebellum-mediated latency-duration balance minimizes the endpoint variability in anti-saccadic eye movements

16.40 **Thomas Eggert**
The variability of saccade trajectories explained by the superposition of planning noise, premotor noise, and motor noise

17.00 **Chrystalina Antoniades**
Oculomotor effects of medical and surgical treatments of Parkinson's disease

17.15 **Anna Sadnicka**
A unifying motor control framework for task-specific dystonia

17.30 **Mayu Takahashi**
Brainstem Neural Circuits for Horizontal and Vertical Saccadic Eye movements and their Frame of Reference

17.45 Closing

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

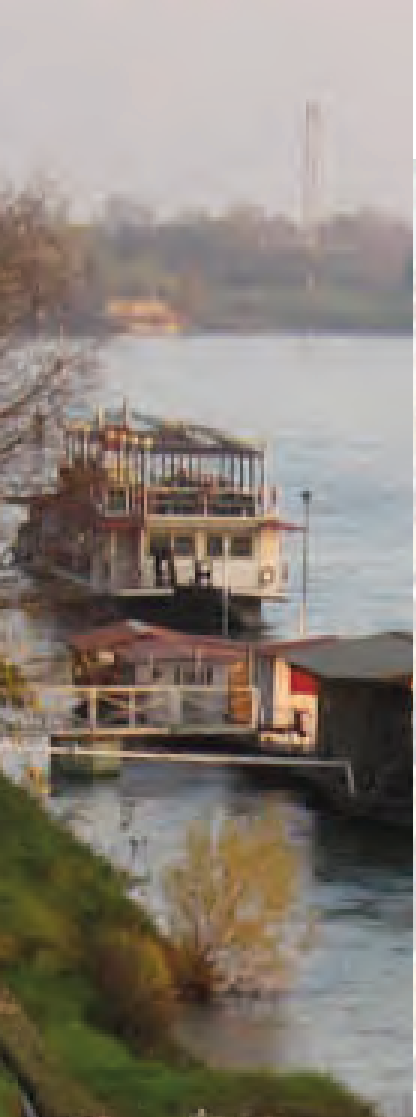
Thursday 7th June 2018

18.30-19.30 Guided visit. Walking tour: Pavia and its history

19.30 Social dinner at Bellisomi-Vistarino Palace

In the 18th century the Bellisomi-Vistarino Palace was the residence of a noble family. It is situated in the heart of Pavia, facing the Ticino River. It is a proper "Villa of delight", with frescoed rooms, spaces reserved for music, for reading and conversation, a park, a viewpoint, a chapel and stables.

The palace has recently been brought to life by extensive renovation works and it is the site of the University Foundation Alma Mater Ticinensis, which organizes high level training courses, conferences, seminars and concerts.



Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

Friday 8th June 2018 PROGRAM

SHORT COURSE

08.30 Registration

Maps and sensorimotor transformations

09.00 **J. Van Opstal**

10.15 **B. Seemungal**

10.45 *Coffee break*

Neuromimetic models and oscillations

11.00 **L. Optican**

12.15 **J. Rucker**

12.45 Short course closing remarks

13.00-13.30 *Light lunch* (Full Meeting participants only)

The conference venue can be reached by bike, by bus, by shuttle

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

Friday 8th June 2018

RESEARCH MEETING

13.45 Registration

V Session

14.20 **Amir Kheramand**
The role of temporo-parietal cortex in upright perception and the link with torsional eye position

14.35 **Diego Kaski**
A theoretical framework for 'unexplained' dizziness in the elderly

14.50 **Catherine Cho**
Vestibulocerebellar basis of mal de debarquement syndrome

15.05 **Oleg Komogortsev**
The use of oculomotor plant models and eye movements in cybersecurity research

15.20 **Michael Brodsky**
Essential Infantile Esotropia: Potential Role of Extended Subcortical Neuroplasticity

15.35 **Pierre Daye**
Event-based control using inter-events duration reaches arbitrary accuracy and increases control dynamic range

15.50 *Coffee break*

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

Friday 8th June 2018

VI Session

16.10 **Faisal Karmali**
Optimal velocity storage models for changing vestibular function

16.25 **Jorge Otero-Millan**
Rebound nystagmus, a window to the oculomotor integrator

16.40 **Giovanni Bertolini**
Nonlinearity in gaze holding: experimental results and possible mechanisms.

17.10 **Kenichiro Miura**
A model of optokinetic responses that consists of two different visual motion processing pathways

17.25 **Sinem Balta Beylergil**
A machine learning approach characterizes the tremor irregularity in dystonia

17.40 **Elena Pretegiani**
Temporal coupling of action and perception in health and Parkinson's disease

18.00 Closing remarks

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

POSTER SESSION 6th /7th/ 8 th June 2018

N°	Family Name	Name	Title
1	**Balta Beylergil**	Sinem	Vestibular heading perception in Parkinson's disease patients treated with deep brain stimulation
2	**Cherif**	Amel	Emergence of multiple postural control strategies in destabilizing environments
3	**Chisari**	Chiara	Expanded study of ocular-motor fatigue in internuclear ophthalmoparesis due to multiple sclerosis
4	**Colnaghi**	Silvia	The functional head impulse test. Preliminary results
5	**Federighi**	Pamela	Dynamic properties of saccades distinguish different forms of spinocerebellar ataxia
6	**Garzorz**	Isabelle	Visual-vestibular conflict detection depends on fixation
7	**Goffart**	Laurent	The relations between the mathematics and the neurophysiology of visually-guided eye movements
8	**Hudson**	Todd	Eye-hand re-coordination in chronic stroke
9	**Jung**	Ileok	Modulation of pendular nystagmus by visual inputs in multiple sclerosis: mathematical modeling for mechanism
10	**Karmali**	Faisal	The role of vestibular precision in postural sway and manual control
11	**Mayadali**	Ümit Suat	Histochemical characterization of functional cell groups of the saccadic system in monkey and human
12	**Myrov**	Vladislav	A new approach for estimation of spiketrain patterns in basal ganglia
13	**Özdemir**	Murat Can	Improving the estimation of two rate models in visuomotor reach adaptation by advanced preprocessing methods
14	**Pyatka**	Natalia	Role of proprioception in the integrative network model for dystonia
15	**Ramaioli**	Cecilia	Can erroneous sensory processing explain functional dizziness? An experimental approach based on predictive coding
16	**Rizvi**	Macym	Hyperexcitable reciprocally innervating mesencephalic network causes paraneoplastic seesaw nystagmus and opsoclonus
17	**Sadnicka**	Anna	When enough is enough! High motor variability in DYT1 dystonia is associated with impaired visuomotor adaptation.
18	**Scaramuzzi**	Matteo	Response to patching in amblyopic patients with and without fusion maldevelopment nystagmus
19	**Sedov**	Alexey	The role of basal ganglia in the integrative neural network model for cervical dystonia
20	**Shaikh**	Aasef	Atypical seesaw nystagmus
21	**Wei**	Qi	Computational modeling of the role of compartmentalization in superior oblique palsy
22	**Xiang**	Min	A postural control model implicates slowing of sensory feedback in worse balance control in Acute Traumatic Brain Injury patients
23	**Zanca**	Dario	A unified computational framework for visual attention dynamics

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

SOCIAL PROGRAM

Wednesday 6th June 2018

18.10 Closing Research Meeting
18.20 Meet your storytellers at aula Foscolo
Guided tour of the historical lecture halls of Pavia University

- Aula Foscolo
- Old Library
- Aula Scarpa (anatomic theatre)
- Aula Volta (physics cabinet)
- A stroll through the courtyards of the University building, talking about Golgi and other protagonists of the Golden Age of the local athenaeum
- Transfer to Pavia main square and then to the Broletto, the ancient city hall, were the participants will receive the official greetings of the mayor
- Welcome aperitif at the Broletto

Thursday 7th June 2018

17.45 Closing Research Meeting
17.55 Meet your storytellers at aula Foscolo
History Walk through the streets of the city centre: an involving journey through art, history and the protagonists that have made Pavia one of the most charming art cities of Lombardy.
The stroll will finish at Palazzo Vistarino - former residence of one of the noblest families of the city – where participants will enjoy a social dinner

Mathematical Modeling in Motor Neuroscience. A short course and scientific meeting

GENERAL INFORMATION

Conference venue:

Short Course 6-7-8 June, mornings

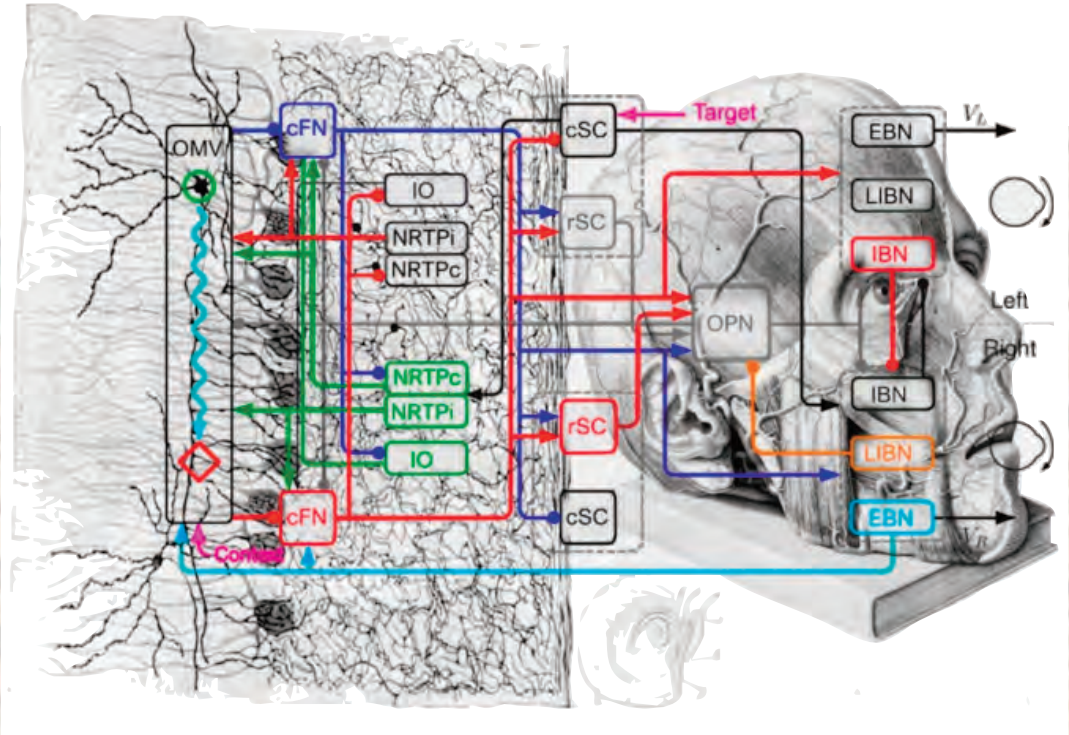
Fondazione Mondino Istituto Neurologico Nazionale
a Carattere Scientifico | IRCCS
Via Magenes 27100 Pavia - Italia

Research Meeting 6-7-8 June, afternoons

Aula Foscolo - Università degli Studi di Pavia
Corso Strada Nuova, 65 – 27100 Pavia - Italia

Official language:

The official language is English. Simultaneous interpretation is not provided. It is therefore expected that authors are able to present their research more or less fluently in English.



The image shows on the left hand side the drawing of the cerebellum presented by Camillo Golgi at his Nobel lecture in 1906, on the right hand side a drawing of the human head by Antonio Scarpa (1801), and, overlayed on both drawings, a mathematical model of the saccadic system by Lance Optican (2017) in Optican LM and Pretegiani E (2017) A GABAergic Dysfunction in the Olivary–Cerebellar–Brainstem Network May Cause Eye Oscillations and Body Tremor. II. Model Simulations of Saccadic Eye Oscillations. Front. Neurol. 8:372. doi: 10.3389/fneur.2017.00372). Both Antonio Scarpa and Camillo Golgi were professors in the Faculty of Medicine at the University of Pavia.

Technology partner:

EyeSeeTec

Local Organizining secretariat:

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