IBRO NERKA School on
NEUROPHOTONICS

lecture and practical-based

28 Nov – 05 Dec, 2014 | Belgrade, Serbia

Venues:

Faculty of Biology University of Belgrade, **Center for Laser Microscopy**
Institute of Physics University of Belgrade, **Photonics Center**

Travel fellowships available for students (all levels) and early stage researchers.
Send CV and motivation letter (up to one page) to pandjus@bio.bg.ac.rs
Deadline: 20 Oct, 2014

TECHNIQUES COVERED:

- Confocal Laser Microscopy *
- Non-linear microscopy: Two-photon Fluorescence Light Microscopy *
- Digital Holographic Microscopy *
- Bioluminescence Imaging, quantification of immunofluorescence and image analysis *
- Fluorescence Correlation Spectroscopy (FCS)
- Photoactivated Localization Microscopy (PALM)
- Total Internal Reflection Fluorescence Microscopy
- Coherent Anti-Stokes Raman Scattering microscopy and Correlation Microscopy
- X-ray fluorescence microscopy
- Voltage-sensitive and calcium-sensitive dyes, *in vitro* membrane potential and high-speed ion imaging

Hands-on *

TOPICS COVERED:

- The use of lasers in biology and medicine
- Functional dendritic imaging and axonal transport imaging
- Calcium imaging in subcellular neuronal structures
- Integration of signals in central nervous neurons,
- G protein-coupled receptor (GPCR) interactions
- Vesicular fusions in astrocytes
- Super-resolution microscopy

... and Special lecture:

Ethical use of animals in neuroscience

ORGANIZERS:

Prof. Pavle Andjus, Faculty of Biology, University of Belgrade, Serbia

Ivan Milenković, Faculty of Medicine, University of Leipzig, Germany

SPEAKERS:

Antić Srdjan *(University of Connecticut Health Center, USA)*
Canepari Marco *(INSERM, Grenoble FR)*
Delvendahl Igor *(Faculty of Medicine, University of Leipzig, DE)*
Dučić Tanja, *(CELLS – ALBA, Barcelona, ES)*
Jelenković Branislav *(Inst. of Physics, Photonics Center, Belgrade, RS)*
Jovanović-Talisman Tijana *(City of Hope, Los Angeles, USA)*
Kranz Alexander *(Fraunhofer Institute, Leipzig DE)*
Krmpot Aleksandar *(Inst. of Physics, Photonics Center, Belgrade, RS)*
Marinković Petar, *(DZNE, Munich, DE)*
Mitrečić Dinko, *(Croatian Institute for Brain research, Zagreb, CRO)*
Pantelić Dejan, *(Inst. of Physics, Photonics Center, Belgrade, RS)*
Rabasović Mihailo *(Inst. of Physics, Photonics Center, Belgrade, RS)*
Stamenković Stefan *(Center for Laser Microscopy, Faculty of Biology, RS)*
Todorović Zoran *(head of the Ethics Council of Republic of Serbia)*
Vukojević Vladana *(Karolinska Institute, Stockholm, SE)*

IBRO NERKA Biophysics School on

NEUROPHOTONICS

„Towards The International Year of Light and Light-based Technologies 2015“

28 Nov – 05 Dec 2014, Belgrade

Venues:

Faculty of Biology University of Belgrade, Center for Laser Microscopy

Studentski trg 3

http://www.bio.bg.ac.rs/index.php?jez=eng

http://www.bio.bg.ac.rs/clm/index-en.htm

Institute of Physics University of Belgrade, Photonics center

Pregrevica 118

http://www.ipb.ac.rs/index.php/en/

http://photonics.ipb.ac.rs

Organizers:

Prof. Pavle Andjus, Faculty of Biology, University of Belgrade, Serbia

Ivan Milenković, Faculty of Medicine, University of Leipzig, Germany

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2 SCHOOL SCHEDULE

2.1 FRIDAY, 28 NOV 2014

Arrivals

Location: **Faculty of Biology**

14:00 – 15:00 *Registration*

15:00 Welcome address and snacks

15:15 – 18:15

Srdjan Antić, *University of Connecticut Health Center (USA)*

I) The use of lasers for functional dendritic imaging - voltage-sensitive and calcium-sensitive dye recordings from dendritic branches.
II) The use of lasers for uncaging neuroactive substances for the purpose of understanding the integration of signals in central nervous neurons.

19:00 *Dinner – get together and meet the speaker*

2.2 SATURDAY, 29 NOV 2014

Free morning

Location: **Faculty of Biology**

13:00 – 16:00

***Igor Delvendahl**, Faculty of Medicine, University of Leipzig (DE)*

I) Two-photon excitation microscopy - principles and applications
II) Two-photon calcium imaging in subcellular neuronal structures

16:00 – 19:00

***Vladana Vukojević**, Karolinska Institute, Stockholm (SE)*

I) Quantitative characterization of G protein-coupled receptor (GPCR) interactions in the plasma membrane.
II) Live cell study by methods with single-molecule sensitivity Fluorescence Correlation Spectroscopy (FCS) and Photoactivated Localization Microscopy (PALM)

19:00 *Dinner – get together and meet the speakers of the day*

2.3 SUNDAY, 30 NOV 2014

Location: **Faculty of Biology**

09:00 – 10:00 *On site – breakfast and snacks get together*

10:00 – 12:00

Marco Canepari, *INSERM, Grenoble (FR)*

Light sources and cameras for standard in vitro membrane potential and high-speed ion imaging

12:00 – 13:30 *Lunch*

13:30 – 15:00 **Special public lecture:**

Zoran Todorović, *Head of the Ethics Council of Republic of Serbia*

Ethical use of animals in neuroscience.

Discussion

15:00 – 18:00

Dinko Mitrečić*, Croatian Institute for Brain research, Zagreb (CRO)*

I) Tracing of stem cells in brain research using fluorescent markers

II) ***Hands-on*** demonstrations on confocal microscope *(Center for Laser Microscopy)*

19:00 *Dinner – get together and meet the speakers*

2.4 MONDAY, 01 DEC 2014

Location: **Institute of Physics**

09:00 – 10:00 *On site - breakfast and snacks get together*

10:00 – 10:15 *Welcome address*

10:15 – 13:15

10:15 – 11:15	***Dejan Pantelić**, Inst. of Physics, Photonics Center, Belgrade (RS)*
	Physical principles of optics and microscopy
11:15 – 12:15	***Branislav Jelenković**, Inst. of Physics, Photonics Center, Belgrade (RS)*
	Basics of microscopy and elements of a microscope 1
12:15 – 13:15	Basics of microscopy and elements of a microscope 2

13:15 – 14:30 *Lunch*

14:30 – 18:30

14:30 – 15:30	***Aleksandar Krmpot**, Inst. of Physics, Photonics Center, Belgrade (RS)*
	Light sources, lasers and detectors
15:30 – 16:30	Nonlinear microscopy
16:30 – 17:30	***Dejan Pantelić**, Inst. of Physics, Photonics Center, Belgrade (RS)*
	Holography and holographic microscopy
17:30 – 18:30	***Mihailo Rabasović**, Inst. of Physics, Photonics Center, Belgrade (RS)*
	Correlation spectroscopy and CARS

Free evening

2.5 TUESDAY, 02 DEC 2014

Location: **Institute of Physics**

09:00 – 10:00 *On site - breakfast and snacks get together*

10:00 – 13:00

***Tijana Jovanović-Talisman**, City of Hope, Los Angeles (USA)*

I & II) "Advances in super-resolution microscopy"

13:00 – 14:30 *Lunch*

14:30 – 17:30 and 18:00 – 20:00

***Stefan Stamenković**, Faculty of Biology, Center for laser microscopy, Faculty of Biology (RS)*

Quantification of immunofluorescence (***hands on***) - Groups I and II

around 20:00 *Get together at the river bank and free evening*

2.6 WEDNESDAY, 03 DEC 2014

Location: **Institute of Physics**

09:00 – 10:00 *On site - breakfast and snacks get together*

Experiments in groups

	OPTO	CORR	NLM	HOLO	SEM	Free time
10.00-11.00	1	2	3	4	5	6
11.00-12.00	2	3	4	5	6	1
12.00-13.00	3	4	5	6	1	2
13.00-14.30	*Lunch*					
14.30-15.30	4	5	6	1	2	3
15.30-16.30	5	6	1	2	3	4
16.30-17.30	6	1	2	3	4	5

18:00 – 20:00

Stefan Stamenković, *Faculty of Biology, Center for laser microscopy, Faculty of Biology (RS)*

Quantification of immunofluorescence (***hands on***) - Group III

20:30 *Dinner – get together and meet the speakers*

2.7 THURSDAY, 04 DEC 2014

Location: **Faculty of Biology**

09:00 – 10:00 *On site - breakfast and snacks get together*

10:00 – 13:00

Petar Marinković, *German Center for Neurodegenerative Diseases (DZNE), Munich (DE)*

I) Imaging axonal transport in health and disease
II) Imaging structural and functional changes in neurodegenerative diseases

13:00 – 14:30 *Lunch*

14:30 – 17:30

Tanja Dučić*, CELLS – ALBA, Barcelona (ES)*

I & II) X-ray fluorescence microscopy and applications in neurosciences

18:00 – 20:00

Alexander Kranz*, Fraunhofer Institute, Leipzig (DE)*

I) Image analysis - colocalization and pitfalls in biological image processing
II) Bioluminescence Imaging in neuroscience research

(***lectures with hands-on***)

21:00 *Farewell dinner*

2.8 FRIDAY, 05 DEC 2014

Location: **Faculty of Biology – *Center for Laser Microscopy***

10:00 – 12:00

Stefan Stamenković, *Faculty of Biology, Center for laser microscopy, Faculty of Biology (RS)*

Quantification of immunofluorescence (***hands on***) - Group IV

12:00 – 14:00

Discussion panels: „Take home messages“

Departure

3 ADDITIONAL INFORMATION

3.1 ARRIVAL, TRAVEL, DEPARTURE

Transportation from the airport to the City Center:

1. **Public transportation – nr. 72 bus line**. Airport - City Center (Zeleni venac Bus station), runs every 30 minutes from 5:30 until midnight. City Center - Airport runs every 30 minutes from 4:40 until 23:40. Single fare available on the bus is 150 dinars. The bus stop is located in front of the terminal building, between Terminals 1 and 2. Journey time is about **40-60 minutes** (all 29 stations), depending on the traffic.

Airport info

The "Nikola Tesla" airport in Surčin is located 18 km from the center of Belgrade. Flight information can be obtained through the **www.beg.aero/en/** website.

2. There is a **taxi transportation** at the airport. You should look for Taxi information stand at the arrivals hall. If you wish to take a taxi to your destination, go to this stand and state your destination. You will be given a voucher with the price you will have to pay the taxi driver once you get to your destination. “New Belgrade” and the City Center are in the first, cheapest zone and getting there will cost you 1800 dinars (~15 euro). CAUTION: *Apart from the voucher you will be given a leaflet with information on what to do if the taxi driver charges you more than the amount stated on the voucher*! *Ignore the taxi drivers accosting travelers in the airport building, they are probably scammers.*
3. **Mini bus (Line A1)**, Airport - City Center (Slavija Square). Runs every 20 minutes from 5:00 to 18:40, then every 60 minutes. A detailed schedule is provided at www.beg.aero. Single fare is 300 dinars, available on the bus. The bus stops are located in front of international departures and international arrivals, levels 0 and -1. Journey time is about 30 minutes, depending on the traffic.

3.2 EXCHANGE OFFICES

Since you cannot exchange foreign currencies into dinar outside of Serbia, you have to bring freely convertible currencies like Euro, US/Australian/Canadian Dollar, Swiss Franc or British pound and exchange it here upon arrival.

Airport/railway/bus exchange offices offer less favorable rates than offices in the city and we advise you to exchange only minimal amount of money needed for the transportation to the city.

3.3 INTERNET, PHONES AND LAPTOPS

Almost every hotel, hostel and apartment has Internet connection and in many cases, there is Internet corner with computer, which is available for use. As well, there are several Internet cafes in

the center of the city. For local and international calls, you can use your cell phone and purchase local SIM card in order to avoid high roaming rates.

However, we urge students to bear in mind that using their **own laptop** for "Quantification of immunofluorescence" hands on is **preferable**!

3.3.1 Students' presentations

Students will have possibility for **an informal presentations** of their scientific work (results, ideas, troubleshooting etc.) during free time. Therefore, if you have any *extraordinary preferences* for your presentation please inform us in due course (before you arrive), so we can avoid any inconveniences.

3.4 VENUES AND TRANSPORTATION

The address of **Faculty of Biology University of Belgrade, Center for Laser Microscopy** is **Studentski trg 3**. From the students accommodation there is a direct **Public transportation, nr. 75 or 77 bus line**. Bus line 75 has route "Zeleni venac - Bežanijska kosa", and destination is 8 (or 9) stations long; station name is "Studentska" (or "Studentski grad"), walking to destination is ~ 100m.

Photonics center at Institute of Physics, University of Belgrade is located at **Pregrevica 118**.

From students' dormitory (***25-30 min***):
Walking to the station "Studentski grad" (67 m)
- Bus line 45, 8 stations, and exit at "Trg Branka Radičevića"
Take another bus at the same station,
- Bus line 17, 73 or 84, 3 stations, exit at "Tršćanska"
Walking to destination (296 m)

From the City Center (***25-30 min***):
Taking a bus at "Zeleni venac" station
- Bus line 84, 11 stations, and exit at "Tršćanska"
Walking to destination (296 m)

This section is for information purpose. You will have our assistance to get to your destination for the first time.

3.5 CITY MAPS

All participants of the school will be individually provided with **online maps** showing their accommodation, school venues and places of interest (exchange offices, super-markets, restaurants) in the City Center. Maps will be given in two different formats: GoogleMaps and public transportation lines via PlanPlus website, and both can be viewed on personal mobile devices.

Tourist Organization of Belgrade

www.tob.rs

All foreign attendees will also receive **City Guides** kindly provided by **The Tourist Organization of Belgrade (TOB)**. It is a public service of the Assembly of the City of Belgrade, founded to conduct activities relating to development, preservation and protection of tourist values on the territory of Belgrade.

We truly hope you will enjoy your staying in Belgrade!

3.5.1 Students' accommodation

Studentski Grad (Serbian Cyrillic: **Студентски Град**) is located in urban neighborhood of Belgrade. It is located in Belgrade's municipality of Novi Beograd. It is the largest dormitory in Belgrade, originally constructed to accommodate nearly 5000 students.

Info table at the bus station in front of students' dormitory. All blue numbers are day bus lines.