



*Bringing Together Advances in  
Neurobiology, Photonics and Imaging*

# FRONTIERS IN NEUROPHOTONICS

International summer school on advanced live cell imaging techniques

**QUEBEC CITY**  
**May 18-24, 2008**

The school will combine tutorials given by experts in photonics and neuroscience and hands-on experiments involving advanced optical approaches to measure, manipulate and follow molecular events in living neuronal cells.

## Topics covered include

- Fluorescence lifetime approaches
- Single membrane receptor tracking
- Video-rate multimodal imaging *in vivo*
- Coherent Anti-stokes Raman Scattering
- Tracking cell migration in live brain slices
- Photobleaching & Photoactivation techniques
- Imaging protein trafficking in dendritic spines

## Limited registration available

Submit CV, statement of interest and names of 3 reference contacts to [cedric.lopez@crulrg.ulaval.ca](mailto:cedric.lopez@crulrg.ulaval.ca)  
Applications: Jan. 14 - Feb. 22, 2008



More information and last year's program:  
[www.neurophotonics.ca](http://www.neurophotonics.ca)



# Neurophotonics Summer School 2008

## Arrival Sunday PM

17:00-19:00: Welcome reception and overview of Summer School (Yves De Koninck)

	Monday 19	Tuesday 20	Wednesday 21	Thursday 22	Friday 23	Saturday 24
9:00-10:30	<b>Richard Robitaille :</b> Calcium imaging to study glial-neuron interactions	<b>Alan Fine:</b> Monitoring synaptic plasticity at single synapses in brain slices	<b>Denis Boudreau:</b> Principles of Fluorescence, FRET and Lifetime	<b>Paul De Koninck:</b> Tracking protein dynamics and interactions in live neurons I	<b>Paul De Koninck:</b> Tracking protein dynamics and interactions in live neurons II	Student presentations
10:30-11:00						
11:00-12:30	<b>Lisa Topolnik:</b> Functional calcium imaging : principles, advantages and pitfalls	<b>Ed Ruthazer:</b> Approaches to label neurons for tracking <i>in-vivo</i>	<b>Brian Wilson:</b> Photodynamic Therapy	<b>Daniel Côté:</b> Multimodal imaging <i>in vivo</i>	<b>Daniel Côté:</b> Non-linear microscopy modalities (2P, SHG, CARS)	
12:30-13:30						
13:30-14:30	Experiment preview and Demonstration	Experiment preview and Demonstration	Experiment preview and Demonstration	Experiment preview and Demonstration	Experiment preview and Demonstration	
14:30-18 :00	Hands-on Lab experiments	Hands-on Lab experiments	Hands-on Lab experiments	Hands-on Lab experiments	Hands-on Lab experiments	
18:00-19:30			<b>Paul Wiseman:</b>			
19:30-22:00	Data analysis and preparation for student presentations	Data analysis and preparation for student presentations	Introduction to image correlation methods Group diner	Data analysis and preparation for student presentations	Data analysis and preparation for student presentations	

## Hands-on sessions:

The afternoons will be dedicated to hands-on experiments in the lab (in teams of 2-3 students). Each team will perform a different experiment everyday under the guidance of tutors. Topics covered include:

<b>FRET-FLIM:</b> -Different approaches for FRET: spectral, acceptor photobleaching method and Fluorescence Lifetime Imaging Microscopy (FLIM) -Applied to the protein-protein interactions and ion fluctuations in different subcellular compartments of a neuron	<b>Video-rate wide-field imaging of single molecule dynamics</b> -Tracking of single membrane receptors on cultured neurons with Quantum dots as fluorescent tags. -Monitoring of synaptic receptor lateral movement on the membrane in and out of synapses. -Quantification of receptor mobility, area covered, dwell time inside synapse, etc.
<b>Cell tracking in live tissue:</b> -Tracking live cells migration and differentiation in live tissue using different labeling strategies (retroviral infections, single cell electroporation, etc.) and imaging modalities	<b>Live imaging of GFP-tagged protein translocation in cultured neurons</b> -Time lapse imaging of the dynamic translocation of GFP-tagged intracellular proteins in live neurons. -Measurements of movement dynamics with FRAP approaches and photo-stimulation of proteins tagged with photo-inducible GFP.
<b>Linear and non-linear video-rate microcopy in live animals</b> -Animal preparation, optical tool, video-rate hardware, movement correction	<b>CARS Microscopy</b> -Myelin imaging in nerves and spinal cord using Coherent Raman