
# 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*

Applications: Jan. 14 - Feb. 22, 2008

More information and last year's program:
**www.neurophotonics.ca**

UNIVERSITÉ LAVAL · Le Centre de recherche Université Laval Robert Giffard · McGill · COPL Centre d'optique, photonique et laser · NeuroPhysics · ICIP CIPI · Fondation canadienne pour l'innovation Canada Foundation for Innovation · CIHR IRSC Canadian Institutes of Health Research / Instituts de recherche en santé du Canada

# 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 | **Richard Robitaille :** Calcium imaging to study glial-neuron interactions | **Alan Fine**: Monitoring synaptic plasticity at single synapses in brain slices | **Denis Boudreau:** Principles of Fluorescence, FRET and Lifetime | **Paul De Koninck:** Tracking protein dynamics and interactions in live neurons I | **Paul De Koninck:** Tracking protein dynamics and interactions in live neurons II | Student presentations |
| 10:30-11:00 | | | | | | |
| 11:00-12:30 | **Lisa Topolnik:** Functional calcium imaging : principles, advantages and pitfalls | **Ed Ruthazer:** Approaches to label neurons for tracking *in-vivo* | **Brian Wilson:** Photodynamic Therapy | **Daniel Côté:** Multimodal imaging *in vivo* | **Daniel Côté:** 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 | | | **Paul Wiseman:** Introduction to image correlation methods | | | |
| 19:30-22:00 | Data analysis and preparation for student presentations | Data analysis and preparation for student presentations | 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:**

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