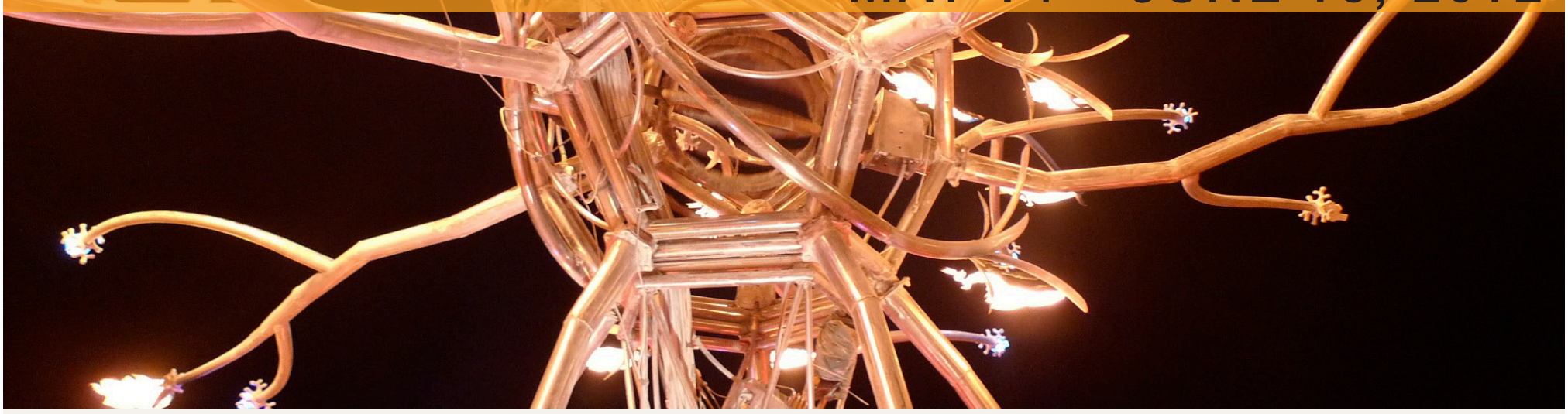
FOCUS PROGRAM:
TOWARDS MATHEMATICAL MODELING OF NEUROLOGICAL DISEASE FROM CELLULAR PERSPECTIVES

MAY 14 – JUNE 15, 2012



MILLIONS OF PEOPLE SUFFER FROM SOME FORM OF NEUROLOGICAL DISEASE.

Abnormalities in brain circuits and their activities are recognized as a place to focus in untangling brain disorders. A mechanistic understanding, as can be brought about by mathematical modeling and analyses, is needed to help advance our understanding of these complex neurological diseases. However, developing and analyzing models of normal and pathological dynamic activities in these complex circuits is highly challenging. How does one include cellular detail in mathematical models to allow linkage to experiment and neurological disease? What techniques and methods can and should be used to analyze the models? These difficult questions need to be brought to the fore to allow us to move forth in our understanding and to provide insights that would be helpful from diagnostic and drug development perspectives.

Throughout the Focus Program's workshops we will bring together neuroscientists, mathematicians, clinicians and experimentalists to present and consider these problems from several viewpoints. Workshop speakers (as listed on the website) will present from clinical, experimental, modeling, and mathematical perspectives. Mathematical tutorial-type talks will occur over the course of the workshops, covering topics such as phase plane analyses, weakly coupled oscillator theory, perturbation theory, bifurcation theory, mean field analyses, and numerical tools. Each workshop will end with a "brainstorming session" for discussion, interaction and sharing of perspectives by all, to try to propose, define, and/or formulate mathematical and computational problems relevant to the Workshop's focus.

Goals for this program include:

- Encouraging trainees in mathematics, physical sciences, life sciences, and interdisciplinary studies, especially new researchers and mathematicians, to get involved in this exciting and challenging field of research
- Making neuroscientists more aware of the mathematical tools available to aid with the study of network models
- Making mathematicians more aware of the challenges involved in modeling biological networks
- Initiating collaborations

ORGANIZERS

Larry Abbott (Columbia University)
Sue Ann Campbell (University of Waterloo)
Nancy Kopell (Boston University)
Frances Skinner (Toronto Western Research Institute/University Health Network and University of Toronto)
David Terman (Ohio State University)

WORKSHOPS AND ACTIVITIES

May 14–18, 2012
Mathematical Neuroscience and Neurobiology Introductory Courses
As a lead-up to the workshops in the following weeks, a series of tutorials will be given. They will provide a basic background in neurobiology and mathematical neuroscience modeling. These tutorials will be mainly geared toward newcomers to the field. However, all are welcome. Registration is required but there will be no charge.

There will be limited space for posters at lunchtime on the first day of each workshop. For information about presenting a poster, please visit the website below.

May 22–23, 2012
Parkinson's Disease Workshop

May 24–25, 2012
Schizophrenia Workshop

May 29–30, 2012
Epilepsy Workshop

May 31–June 1, 2012
Alzheimer's Disease/Pharmaceuticals Workshop

June 4–5, 2012
Anesthesiology/Sleep Disorders Workshop

June 11–15, 2012
Discussion and working groups related to the Focus Program.

Photograph: Ann Larie Valentine

For more information and to register, please visit:
www.fields.utoronto.ca/programs/scientific/11-12/neurodisease

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