INSTITUTE FOR PURE AND APPLIED MATHEMATICS
Los Angeles, California

IPAM/CCB Summer School:
MATHEMATICS IN BRAIN IMAGING

July 14 – 25, 2008

ORGANIZING COMMITTEE: Paul Thompson (UCLA School of Medicine), **Michael Miller** (Johns Hopkins University), **Russ Poldrack** (UCLA Dept. Psychology), **Tom Nichols** (Oxford University/ GlaxoSmithKline), **Keith Worsley** (McGill University), **Jonathan Taylor** (Stanford)

Introduction

This two-week intensive workshop will focus on mathematical techniques applied to brain images to measure, map and model brain structure and function. Topics will range from modeling anatomical structures in MRI scans, and mapping connectivity in diffusion tensor images, to statistical analysis of functional brain images from fMRI and other imaging modalities. Current applications in radiology and neuroscience will be highlighted, as will new directions in the mathematics of structural and functional image analysis. In the second week on Functional Brain Mapping, a series of lectures on diffusion tensor imaging will discuss mathematics and tools for registration, segmentation, fiber tracking and connectivity modeling in tensor and "beyond-tensor" (high-angular resolution) diffusion images, using metrics on Riemannian manifolds. Software implementing a wide range of algorithms will be demonstrated; tutorial notes will be provided. Talks will interest newcomers as well as experts in the field. Morning lectures on the principles behind the methods; afternoon lectures will go in-depth into applications.

Speakers

Week I: **John Ashburner** (University of London), **Nicholas Ayache** (INRIA), **Faisal Beg** (Simon Fraser University), **Christos Davatzikos** (Penn), **Bruce Fischl** (Harvard Medical School), **James Gee** (Penn), **Guido Gerig** (University of Utah), **Monica Hurdal** (Florida State), **Sarang Joshi** (University of Utah), **Christophe Lenglet** (Siemens Research Corporation), **Natasha Lepore (UCLA), Michael Miller** (Johns Hopkins), **Lauren O'Donnell** (MIT), **Xavier Pennec** (INRIA), **Steve Pieper** (Harvard), **Anqi Qiu** (Johns Hopkins), **Guillermo Sapiro** (University of Minnesota), **Steve Smith** (Oxford), **Allen Tannenbaum** (Georgia Institute of Technology), **Paul Thompson** (UCLA), **David van Essen** (Washington University, School of Medicine), **Baba Vemuri** (University of Florida), **Lei Wang** (Washington University), **Carl-Fredrik Westin** (Harvard), **Laurent Younes** (Johns Hopkins)

Week II: **DuBois Bowman** (Emory), **Edward Bullmore** (Cambridge), **Vince Calhoun** (University of New Mexico), **Nelson Freimer** (UCLA), **Ola Friman** (MeVis Research), **Christopher Genovese** (CMU), **Gary Glover** (Stanford), **Isabelle Guyon** (UC Berkeley), **Lars Kai Hansen** (Technical University of Denmark), **Nikolaus Kriegeskorte** (National Institute of Mental Health), **Stephen LaConte** (BITC), **Angie Laird** (University of Texas Health Science Center at San Antonio), **Martin Lindquist** (Columbia), **Thomas Liu** (UCSD), **Thomas Nichols** (Oxford), **Ken Norman** (Princeton), **Judea Pearl** (UCLA), **Russell Poldrack** (UCLA), **J.B. Poline** (CEA), **Steve Smith** (Oxford), **Stephen Strother** (University of Toronto), **Jonathan Taylor** (Stanford), **Paul Thompson** (UCLA), **Tor Wager** (Columbia), **Keith Worsley** (McGill), **Lei Xu** (Vanderbilt)

Participation

Additional information about this program, including links to register and to apply for funding, can be found on the webpage listed below. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission, and we welcome their applications.

www.ipam.ucla.edu/programs/mbi2008

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