



Institute for Pure and Applied Mathematics
University of California, Los Angeles presents a program in
Mathematical Challenges in Astronomical Imaging
January 26-30, 2004

Members of the organizing committee include **Mark Morris**, Chair (UCLA), **Alanna Connors** (Eureka Scientific), **Tim Cornwell** (NRAO), **Brent Ellerbroek** (National Optical Astronomical Observatory), **Don Gavel** (Lawrence Livermore National Lab), **Robert Hanisch** (Space Telescope Science Institute), **Margarita Karovska** (Harvard-Smithsonian Astrophysical Observatory), **Stanley Osher** (IPAM & UCLA), and **David van Dyk** (UC Irvine)

Scientific Overview:

This workshop on *Mathematical Challenges in Astronomical Imaging* will focus on novel mathematical techniques in image reconstruction and image analysis. New approaches to deconvolution will be explored, with emphases on developments in multiscale, Bayesian, and wavelet methods, on the varieties of point spread functions that characterize modern astronomical instrumentation and on the constraints presented by astronomical images (non-negativity, continuity [nebulae] or discontinuity [stars] on sub-resolution scales). Other topics of interest include: image formation from sparse interferometer data, mosaicking and resampling techniques, and source location algorithms in the presence of noise. Imaging challenges specific to low-count-rate techniques such as X-ray, gamma-ray, neutrino and cosmic ray astronomy will also be discussed, including event reconstruction algorithms, and adaptive smoothing techniques. Finally, imaging challenges specific to the cosmic microwave background will be addressed. The goal of this workshop is to bring scientists from the astronomical community together with mathematicians to explore these issues.



NGC 6992, part of the Veil Nebula

Session Topics Include:

- New Types of Astronomical Data (Opening session: 1/2 day)
- Direct Imaging Techniques / Aperture Masking/ Imaging and Modelling with Sparse Interferometer Data (1 day)
- Point Spread Function Extraction for Crowded Fields (1/2 day)
- Time-Domain Imaging (1/2 day)
- Deconvolution (1- 1 1/2 days)
- Imaging With Photon-Limited Data (1/2 day)
- Cosmic Microwave Background Imaging (1/2 day)

Confirmed Speakers Include:

Emmanuel Bertin (Institut d'Astrophysique de Paris)
Tony Chan (UCLA)
Tim Cornwell (NRAO)
Seth Digel (Stanford)
Andrew Fruchter (STScI)
Andrea M. Ghez (UCLA)
Kris Gorski (JPL)
Margarita Karovska (Harvard-Smithsonian Astrophysical Observatory)
Thomas McGlynn (NASA/GSFC)

Ken Mighell (NOAO)
Steven Myers (NRAO)
Stanley Osher (IPAM & UCLA)
Jeff Scargle (NASA/Ames)
Gene Serabyn (JPL)
Michael Shao (JPL)
Jean-Luc Starck (CEA)
Peter Tuthill (U. Sydney)
David van Dyk (UC Irvine)
Edward L. Wright (UCLA)

Participation:

The program is open to the entire mathematical and physical sciences communities. Please visit our website for more information, including an online registration form and an application for support at: <http://www.ipam.ucla.edu/programs/ai2004>
Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission and we welcome their applications.

Please visit our website at

<http://www.ipam.ucla.edu/programs/ai2004>
or email questions to ai2004@ipam.ucla.edu