
Mathematics Opportunities

American Mathematical Society Centennial Fellowships

Invitation for Applications, 1997–1998

Deadline, December 1, 1996

The AMS Centennial Research Fellowship Program makes awards annually to outstanding mathematicians to help further their careers in research. Recently, the AMS Council approved changes in the rules for the fellowships. From 1984–1996, the fellowship program was aimed at mid-career mathematicians. The changes adopted last year redirected the fellowship program toward recent Ph.D.s.

The eligibility rules are as follows. Applicants (1) must be citizens or permanent residents of a country in North America, (2) must have held their doctoral degrees for at least two years at the time of the award, (3) must not have permanent tenure, and (4) must have held less than two years of research support at the time of the award. (Each year of a full-time teaching appointment with teaching load less than four [respectively, five] courses per year on the semester [respectively, quarter] system will count in this respect as one-half year of research support.) Recipients may not hold the Centennial Fellowship concurrently with other research fellowships (e.g., Sloan Foundation Fellowships or National Science Foundation Postdoctoral Fellowships), they may not use the stipend solely to reduce teaching at the home institution, and they are expected to spend some of the fellowship period at another institution which has a stimulating research environment suited to the candidates' research development.

The stipend for fellowships awarded for 1997–98 is expected to be approximately \$37,000, with an additional expense allowance of about \$1,500. Acceptance of the fellowship cannot be postponed. Fellowship holders may use their stipend as full support for a year or may combine it with half-time teaching and use it as half support over a two-year period. Applications should include a short research plan describing both an outline of the research to be pursued and a program for using the fellowship, including institutions at which it will be used and reasons for the choices. The selection committee will base its decision on both the research potential of the applicant,

based upon track record and letters of recommendation, and on the quality and feasibility of the research plan.

The number of fellowships to be awarded is small and depends on the amount of money contributed to the program. The Trustees have arranged a matching program from general funds in such a way that funds for at least one fellowship are guaranteed. Because of the generosity of the AMS membership, it has been possible to award two to four fellowships a year for the past ten years.

The deadline for receipt of applications is **December 1, 1996**. Awards will be announced in February 1997 or earlier if possible.

For application forms write to the Executive Director, American Mathematical Society, P.O. Box 6248, Providence, RI 02940-6248, or send electronic mail to ams@ams.org. Application forms are also available on the World Wide Web via the Internet at URL <http://www.ams.org/committee/profession/>. **Please note that completed applications and references should not be sent to the AMS, but to the address given on the application and reference forms.**

—AMS Announcement

News from DIMACS

DIMACS has announced that its 1996–1997 Special Year will focus on Networks. The goal of this special year is to bring together researchers and practitioners in a wide variety of fields connected to the common theme of Networks to address questions about topics ranging from infrastructure to applications. Special emphasis will be placed on Internet-related topics, as this is a young and growing area where theoretical computer science and discrete mathematics have high potential for long-term impact.

Principal programs of the Networks year will be two post-doctoral fellows at the Center, a program of workshops starting in summer 1996, and an active visitor program hosted at the Center's five sites at Rutgers, Princeton, AT&T Research, Bellcore, and Lucent Technologies-Bell Laboratories. The principal organizers of the program are Stuart Haber of Bellcore (stuart@bellcore.com), David Johnson of AT&T Research (dsj@research.att.com), and Mihalis Yannakakis of Lucent-Bell Laboratories (mihalis@research.att.com). A wide-ranging advisory board

representing industry and academia and both theory and practice, as well as several workshop organizing committees, is also being formed.

At present, the year's topics fall into four overlapping areas: *Network Security*: protocols for electronic commerce, public key infrastructure, network security, and threat models; *Network Applications*: information retrieval, databases and the Web, multimedia transmission and coding, and distributed and collaborative computing; *Network Control*: routing, congestion and admission control, network protocols, and mobile computing; and *Network Design*: topology and connectivity, switch design, and facilities location.

Most workshops will be structured so as to include both theorists and practitioners, with the practitioners being drawn both from the systems side of academia and from a broad spectrum of industry, including key support from the three industrial partners in DIMACS. Workshops presently planned are:

Workshop on Trust Management in Networks, September 30–October 2, 1996, organized by Joan Feigenbaum (jff@research.att.com), David Maher (dpm@allegra.att.com), and Ernie Brickell.

Real-time Internet Services, November 6–8, 1996, organized by Mario Garzia (mgar@hogpa.att.com), Albert Greenberg, and Mike Luby.

Network Threats, December 4–6, 1996, organized by Rebecca Wright (rwright@research.att.com), Peter Neumann (neumann@csl.sri.com), and Steve Bellovin (smb@research.att.com).

Selected Topics Related to the Electronic Marketplace, Spring 1997, organized by Matt Franklin (franklin@research.att.com) and Avi Rubin (rubin@bellcore.com).

Architecture and Algorithmic Aspects of Communication Networks, Spring 1997, organized by Éva Tardos (eva@cs.cornell.edu), Serge Plotkin (plotkin@theory.stanford.edu), and Israel Cidon (cidon@tera.technion.ac.il).

Workshop on Network Design: Connectivity and Facilities Location, Spring 1997, organized by Ding-Zhu Du (dzd@cs.umn.edu) and Panos Pardalos (pardalos@math.ufl.edu).

Workshop on Non-blocking and Almost Non-blocking Networks, Spring–Summer 1997, organized by Frank Hwang (fkh@research.att.com) and Ding-Zhu Du (dzd@cs.umn.edu).

Workshop on Traffic and Network Modelling and Analysis, Spring–Summer 1997, organized by Sandeep Bhatt (bhatt@bellcore.com), Andrew Ogielski (ato@bellcore.com), and Debasis Mitra (advisor).

Other workshop topics under consideration are Network Protocols, Mobile Communications and Computing, and Computing the Discrete Log.

Information about the programs is regularly updated on the Center's WWW pages at <http://dimacs.rutgers.edu/> and posted to newsletters, e-mail groups and other destinations. To be placed on a mailing list for announcements, send an e-mail request to publicity@dimacs.rutgers.edu. The program invites senior and graduate student scientists to apply for support for visits to the Cen-

ter. See http://dimacs.rutgers.edu/SpecialYears/1996_1997/ for information about applying.

DIMACS is the Center for Discrete Mathematics and Theoretical Computer Science; it is principally funded under the National Science Foundation's Science and Technology Centers program, with additional support from the New Jersey Commission on Science and Technology, AT&T, Bellcore and Lucent-Bell Laboratories.

—DIMACS Announcement

Deadlines for the Infrastructure Program

The Infrastructure Program of the Division of Mathematical Sciences (DMS) of the National Science Foundation sponsors a range of programs in support of the mathematical sciences. Listed below are deadlines for the Infrastructure Program. For further information, contact Lloyd E. Douglas, ldouglas@nsf.gov, 703-306-1874; or Alvin I. Thaler, thaler@nsf.gov, 703-306-1880. Further information about DMS programs may be found on <http://www.nsf.gov/mps/dms/>. The mailing address is: Division of Mathematical Sciences, National Science Foundation, Room 1025, 4201 Wilson Boulevard, Arlington, VA 22230.

Mathematical Sciences Postdoctoral Research Fellowships: October 17, 1996.

Faculty Early Career Development (CAREER) Program: October 17, 1996.

University/Industry Cooperative Research Program in the Mathematical Sciences: November 13, 1996.

Grants for Scientific Computing Research Environments for the Mathematical Sciences: December 2, 1996.

Research Planning Grants for Women and Minorities: January 15, 1997.

Career Advancement Awards for Women and Minorities: January 15, 1997.

Group Infrastructure Grants (GIG): January 16, 1997.

—DMS Announcement

News from the Newton Institute, Cambridge, UK

The Isaac Newton Institute for Mathematical Sciences has a number of programs scheduled for the coming academic year.

Four-Dimensional Geometry and Quantum Field Theory, November 4 to December 13, 1996: This six-week program will focus on the exciting recent developments centering around a remarkable duality in four-dimensional space-time. This formally interchanges electricity and magnetism and works in certain nonabelian gauge theories. It has major implications for the understanding of strong interactions in physics and in four-dimensional geometry.

Representation Theory of Algebraic Groups and Related Finite Groups, January to June 1997: There is a famous the-

ory due to Hermann Weyl for the characters of the finite dimensional irreducible representations of simple algebraic groups over the complex numbers. In finite characteristic no analogous formula has been proved, but there is a conjecture due to Lusztig which expresses the irreducible characters as linear combinations of the Weyl characters. This is related to certain characters of affine Kac-Moody algebras and also to the representations of certain quantum groups—the latter being at the moment a rapidly developing branch of mathematics. Other related themes include subgroup structures of the corresponding groups of Lie type.

Non-perturbative Aspects of Quantum Field Theory, January to June 1997: Recent results of Sen, Seiberg, and Witten have made increasingly plausible the idea of a quantum transformation between the weak and strong coupling regimes of spontaneously broken supersymmetric gauge theories in four space-time dimensions. The relevant ideas encompass and unify many topics studied intensively in recent years by particle physicists, including QCD and the theory of instantons, solitons and their quantization, conformal field theory, Yang-Baxter equations, the s and t duality of string theory and the mirror symmetry of Calabi-Yau manifolds. The new results have also already had an impact on pure mathematics, for example in the understanding of the Donaldson classification of four manifolds. The aim of the program is to exploit the idea of electromagnetic duality to gain new insights into fundamental physics (for example, the issue of confinement in QCD), condensed matter physics, and pure mathematics.

Disordered Systems and Quantum Chaos, July to December 1997: The quantum properties of disordered systems have been the focus of considerable attention in many branches of physics, principally nuclear physics and condensed matter physics. Recently it has been recognized that many of the same phenomena also occur in deterministic systems which possess only a few degrees of freedom, but which are chaotic in the classical limit. Even more surprisingly, the theories developed in these areas also have natural counterparts in a number of topics in mathematics, for example, in the study of spectral properties of random operators and random matrices, in the theory of Fourier integral operators, in harmonic analysis (specifically in the theory of the Riemann zeta-function and related L -functions). In the past few years an extremely stimulating and productive cross-fertilization among the above fields has slowly been developing. The aim of the program is to accelerate the already significant rate of progress on some of the important common problems which occur, in different guises, in each area. The main topics upon which the program will focus are localization, fluctuation statistics, and trace formulae, with a particular emphasis on their role in the theory of mesoscopic systems.

Neural Networks and Machine Learning, July to December 1997: Research in machine learning has advanced significantly in recent years, stimulated in part by the emergence of a range of successful, large-scale applications. Examples include optical character recognition, classification of sleep stages from EEG signals, cervical smear screening, and real-time tokamak plasma control. At the same time

there have been many impressive developments in the theoretical foundations of this field, arising from several complementary approaches. Concepts from statistical pattern recognition have been used to formulate a general framework for machine learning based on statistical inference. Parallel developments in computational learning theory have led to a characterization of computational and sample-size requirements for learning problems, while also resulting in powerful new algorithms. In addition, concepts from information theory, differential geometry, and statistical mechanics have been exploited to give alternative insights into neural networks. The principal aims of this program are to promote greater interdisciplinary collaboration between researchers with different theoretical perspectives, to strive for a more unified mathematical framework for neural networks and machine learning, and to stimulate the development of new algorithms for practical applications.

The following programs are planned for 1998: Dynamics of Astrophysical Discs, Arithmetic Geometry, and Biomolecular Function in the Context of the Genome Project. For further information, contact: The Executive Director, Isaac Newton Institute for Mathematical Sciences, 20 Clarkson Road, Cambridge CB3 0EH, UK; telephone 01223 335999; e-mail i.newton@newton.cam.ac.uk; World Wide Web <http://www.newton.cam.ac.uk/>.

— Newton Institute Announcement

NSF Faculty Early Career Development (CAREER) Program

The CAREER program of the National Science Foundation is intended to support excellent proposals from junior faculty who combine strong research activity with a genuine and substantive involvement in education. Proposals will be evaluated on the basis of BOTH research and education. This year the program requires that the duration of awards be at least four but no more than five years. The total award, including administrative costs, will not be less than \$160,000 for a four-year award or less than \$200,000 for a five-year award. The deadline is **October 17, 1996**.

In fiscal year 1996, the Division of Mathematical Sciences (DMS) made four CAREER awards; it is expected that in the coming fiscal year the DMS will again make a small number of CAREER awards. The DMS continues to encourage submission to its “traditional” research grant programs of proposals that integrate research and education activity or that have significant education components. Applicants are encouraged to confer with program directors; see the “Reference” section of this issue of the *Notices* for phone numbers and e-mail addresses.

—DMS Announcement