華中科技大學
HUANGZHONG UNIVERSITY OF SCIENCE AND TECHOLOGY
数学中心简报
2014 年秋季
Newsletter of the Center for Mathematical Sciences
Fall 2014

成立背景
Background

数学正在发生日新月异的变化。一方面，数学内部各分支相互交融，共同提高。在这个过程中，旧的分支因成熟而离开前沿阵地，并成为科学与工程的有效工具；新的分支产生而引出更深刻和更本质的问题，或导致新的理论和方法论，推动数学向更高层次发展。 另一方面，科学与工程问题牵涉越来越深的数学课题。比如，现代制造系统，新材料与化工系统，生命与疾病系统，环境与生态系统，地球与气候系统，以及空间探索系统的研究对数学提出了重大挑战。为应对这些挑战，我们需要更有效的动力系统分析方法，更可靠的随机性与风险性估计方法，以及更合适的计算模拟方法。这就激发了新的数学理论和方法的创立，从而推动数学本身的发展。数学作为一门基础学科，一直在背后推动着科学和工程技术的进步，为现代科学和高新技术的发展奠定基础。国防和国家安全，金融市场与风险，通讯与网络安全，无不与数学紧密相关。

有鉴于此，美国和欧洲的国家基金资助了多个数学研究中心或研究所，希望取得“整体大于部分之和”的效应。这些研究中心或研究所各有特点和优势，而且在地域上分布广泛。美国有基础数学所——MSRI（加州柏克莱），纯粹与应用数学所——IPAM（加州洛杉矶），数学及其应用研究所——IMA（明尼苏达），和 5 个其它规模较小的专题研究所或会议中心。法国有彭加莱数学研究所和 Lebesgue 数学中心。英国有牛顿数学所和麦克斯维尔应用数学所。德国有马普数学所，马普应用数学所，和维尔斯特拉斯数学中心。荷兰有 Stieltjes 数学所和 Korteweg-de Vries 数学中心。在国内也有好几个具有一定影响力的数学中心。

华中科技大学数学中心的成立顺应了这个科学发展趋势。本中心一方面积极倡导数学不同分支之间的相互交叉研究，激发新的合作研究，并催生新的研究领域和研究群体。另一方面，努力推动数学与科学、工程之间的相互交叉研究，引导数学家和科学家之间建立起广泛的联系，从而达到合作共赢。本中心和数学与统计学院以及其它院系紧密合作，促进数学、应用数学与统计学学科的发展。在这个过程中，努力培养和吸引优秀人才，服务国家和社会。

数学探索训练营
Mathematical Exploration Camp（MEC）

数学中心成立的一个重要目标就是培养和选拔尖子学生（包括本科生和博士生），探索新的人才培养机制。在这样的目标推动下，数学中心举办了华中科技大学 2014 年第一期“数学探索训练营”。

此次训练营的活动时间为 2014 年 7 月 20 日至 8 月 1 日，参加这一期“数学探索训练营”的学生来自国内一些重点院校，由各学校优秀的老师选拔推荐到华中科技大学数学中心。这些学生大多是 90 后，有些甚至是 00 后，可是小小年纪就已经在数学专业领域内取得了不错的成绩。他们对数学有着浓厚的兴趣和热情，而且是一群颇具天分的年轻人。

这次活动分为老师集中授课和学生自主讨论研究两个阶段。首先由段金桥老师进行随机动力系统基本理论的授课，然后将学生每三人分成一个研究小组，每个组确保男生女生搭配、不同学校的学生搭配，促进他们相互交流。他们的研究题目包括：布朗运动数学基础及数字模拟、勒维运动数学理论及数字模拟、随机微分方程解的性态、随机系统的 Fokker-Planck 方程的推导、非高斯系统的生成子等等。

罗星宇，15 岁进入中国矿业大学数学系学习。他在数学探索训练营研究的课题是：随机微分方程的数值解法。他认为，随着随机动力系统理论的不断完善，随机微分方程（SDE）会被越来越广泛地应用于生物、化学、经济、金融等各个领域。与确定微分方程相似，很多随机微分方程无法求出解析解，所以构造合适的数值算法就显得尤为重要。

在了解微分方程数值方法的基础上，结合概率论和随机过程等方面的知识，他所在的小组针对一维问题，构造了 0.5 阶 Euler-Maruyama 方法，1 阶 Milstein 方法，1 阶 2 级 Runge-Kutta 方法，并编写了相应的 MATLAB 程序，绘制了不同步长下的数值解与解析解的图像，比较了范数下的误差，结果表明他所在的小组构造的三种数值方法都能很好的逼近解析解，在同等步长条件下 2 级 Runge-Kutta 方法效果最好。

他总结道，在这样的活动中，他不仅收获了知识，还认识了许多志趣相投的朋友。不仅增加了对数学的兴趣，也激发了进一步做相关研究的动力。

王子博，13 岁进入中国矿业大学数学系学习，对数学有浓厚的兴趣。她在数学探索训练营研究的小组课题是随机系统的 Fokker-Planck 方程的推导，她认为如果一个随机微分方程（SDE）的解决方法取决于时间，那么它的概率密度函数也取决于时间，以考虑解决方案的路径概率密度函数的演变，而它的演变受 Fokker-Planck 方程的支配。所以，研究 Fokker-Planck 方程的意义在于解决随机微分方程（SDE）的问题。

在这次的活动中，她运用现有知识对一维和多维 Fokker-Planck 方程使用了不同方法求解，并针对不同的解决方法举出了典型的例子。在她自己的总结中她提到，这次的活动为她以后的学习和研究指明了方向，激发了进一步做相关研究的动力。

非局部偏微分方程及其动力系统研讨会
Workshop on Stochastic Partial Differential Equations

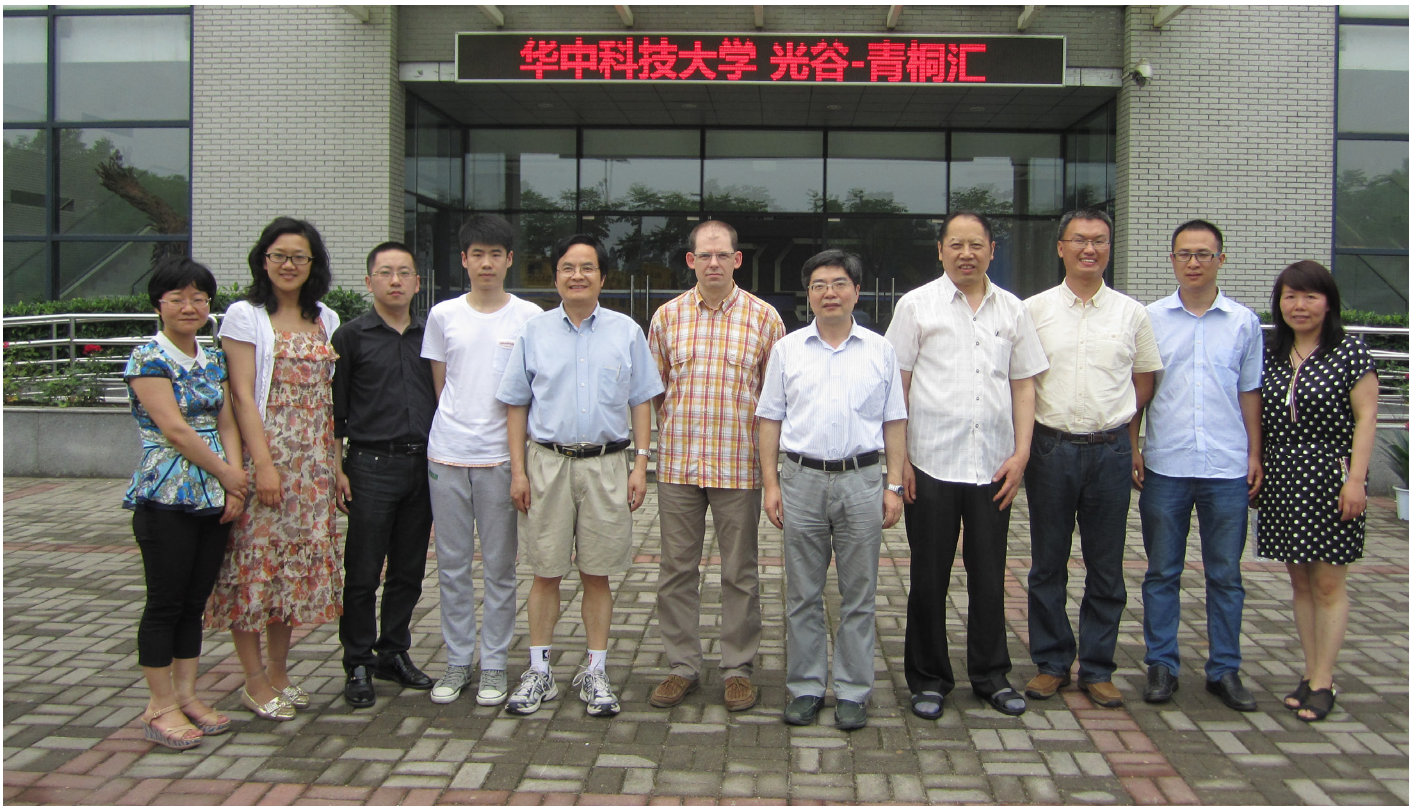
2014 年 6 月 19 日至 6 月 25 日于华中科技大学数学中心举办了“非局部偏微分方程及其动力系统研讨会”。与会代表均为本领域的青年学者。四川师范大学的陈光淦详细讲述了快、慢流形的相互作用；中国矿业大学的严兴杰重点阐述了正常扩散与反常扩散的动力学行为；华中科技大学的何进春介绍了非局部偏微分方程的最新动态以及他在这一领域的最近结果。

2014 年 10 月 22 日至 10 月 26 日又组织了“非局部偏微分方程研讨会”。河南大学的吕广迎展示了其在非局部 Burgers 方程解的适定性的进展；江西师范大学的陈虎元报告了非局部椭圆方程正则性的一些结果；河南师范大学的闫威作了“一类随机偏微分方程不变测度”的报告。

随机偏微分方程研讨会
Workshop on Stochastic Partial Differential Equations

2014 年 6 月 27 日 -30 日，数学中心举办了为期四天的随机偏微分方程研讨会，邀请到了上海师范大学蒋继发教授，南京师范大学高洪俊教授，国防科技大学黄建华教授，陕西师范大学大学聂华教授，河南师范大学闫威博士，耶拿大学（FSU Jena）IlyaPavlyukevich 教授等。

研讨会上各位教授就随机偏微分方程的相关研究做出了精彩报告，深入介绍了各自的研究工作和目前最感兴趣的问题。报告有：蒋继发教授，On the Long-Term Behavior of Time-Dependent or Stochastic May-Leonard Model；高洪俊教授，Explosive solutions of nonlinear stochastic wave equations with damping; 聂华教授，Multiple coexistence solutions of the unstirred chemostat model；IlyaPavlyukevich 教授，Marcus versus Stratonovich for Systems with Jump Noise，Limiting behavior of finite and infinite dimensional stochastic systems driven by stable Levy processes; 闫威博士的报告介绍了 Hamilton 结构、调和分析等内容。



动力系统及其应用会议
International Conference on Dynamical Systems and Applications

2014 年 7 月 16 日至 30 日，由华中科技大学及其数学中心联合主办了动力系统及应用会议。此次会议以庆祝外专千人专家 Peter Kloeden 教授的 65 岁生日为契机，邀请了来自德国、美国、英国、西班牙、澳大利亚和国内 30 多位专家来参加，旨在鼓励、促进动力系统、微分方程及其应用领域科学家们的交流与合作。会议的主要议题涉及微分方程、动力系统及实际问题中的应用。受邀报告人包括 Christian Pötzsche、Peter Hinow、Tomás Caraballo、Jürgen Kurths、Gabriel Lord、Martin Bohner、钟承奎、李用声、李德生、吴付科、王小捷等。

非高斯随机动力系统研讨会
Workshop on Non-Gaussian Stochastic Dynamics

8 月 1 至 8 月 4 号，数学中心举办了非高斯随机动力系统研讨会，来自国内外的多位学者为我们奉献了一场场精彩的报告。

来自英国 Swansea University 的吴奖伦教授，为我们深入讲解了建立概率测度空间，定义 Possion white noise, 从而定义 Levy white noise 的过程，给出了在概率的意义下 Levy 测度的表达式及其特征函数的应用。来自东南大学的乔会杰教授，为我们详细讲解了 Levy –Ito 分解和 Levy-Khintchine 的形式，就 Levy 过程的一些性质进行了分析。来自西北工业大学的许勇教授，通过深入浅出的形式，为我们介绍了非高斯随机动力系统在环境、生物、物理、地球科学等领域的应用，使得同学们对非高斯随机动力系统有了更全面的认识。段金桥教授详细的推导和讲解了 Levy 运动的 Generator 算子和非局部的 Laplacian 算子的关系，并且从随机微分方程解的性态和解的刻画两个方面总结了将来非高斯随机动力系统研究内容和方向。张华、吴召艳等青年教师也针对自己研究中的非高斯随机动力系统 问题做了相关的报告。

通过本次研讨会，会议参加者对非高斯随机动力系统有了更加深刻的认识，并且对国际前沿有关非高斯随机动力系统问题有了进一步了解，而且确定了将来相关问题的研究方向和内容。

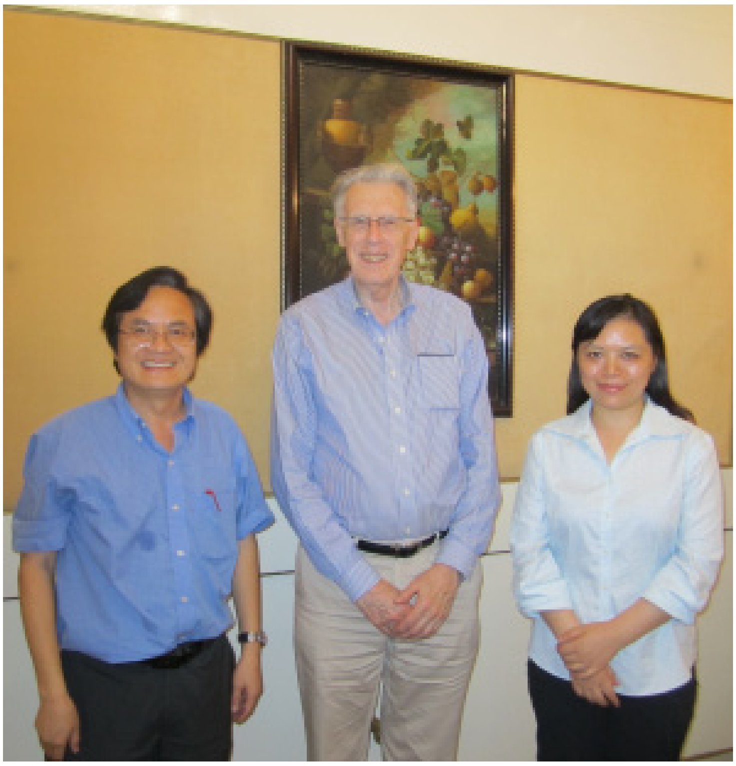
人物来访
Distinguished Visiting Scholars

John Edward Hopcroft

John Edward Hopcroft 是美国康奈尔大学计算机科学系教授、美国科学院与美国工程院院士。他曾先后在普林斯顿大学、斯坦福大学等著名高等学府工作，也曾任职于一些科学研究机构如 NSF（美国科学基金会）和 NRC（美国国家研究理事会），从事对科学研究的规划和行政管理工作。1992 年到 1998 年，他被布什总统指定为监督国家科学基金会的国家科学委员会成员。1986 年，他由于在算法及数据结构设计和分析方面的杰出成就，被授予图灵奖。2005 年，John 获得 IEEE 哈里 • 古德（Harry Goode）纪念奖，并且于 2007 年获得计算机研究协会的杰出贡献奖。2010 年因形式语言与自动机理论及在理论计算机科学领域的大量开创性贡献，获 IEEE 冯·诺依曼奖。

他近年来的研究兴趣主要集中在信息采集和信息获取等方面。他和华中科技大学计算机科学与技术学院何琨副教授正在进行这方面的合作研究。John Edward Hopcroft 工作室于 2014 年 9 月建立，同时隶属于华中科技大学大数据—数据流联合研究中心及华中科技大学数学中心，主要从事信息的采集与获取、算法设计与分析、计算机科学理论等方向的研究。

Hopcroft 很关心中国的教育问题。在来访的过程中，他对数学中心段金桥主任讲述了他对教育，特别是大学高等教育的深刻见解，也阐述了他看到的中国大学教育存在的问题。他认为，教师在人才的培养中发挥着至关重要的作用，一流的大学应当对优秀的教师有充分的奖励机制、为学生潜力的发掘提供无限的可能。这样的理念与华中科技大学数学中心所倡导的新型运行模式不谋而合。在人才的引进方面，数学中心愿积极利用国家的各类人才计划，引进优秀的青年人才来数学中心工作。在人才的培养方面，数学中心频繁组织包括数学探索训练营在内的各类学术活动，发掘对数学有兴趣、有潜质的年轻人，并吸引他们进入数学中心继续深造。数学中心愿意成为教育改革的先行者，探索出更行之有效的人才培养模式。

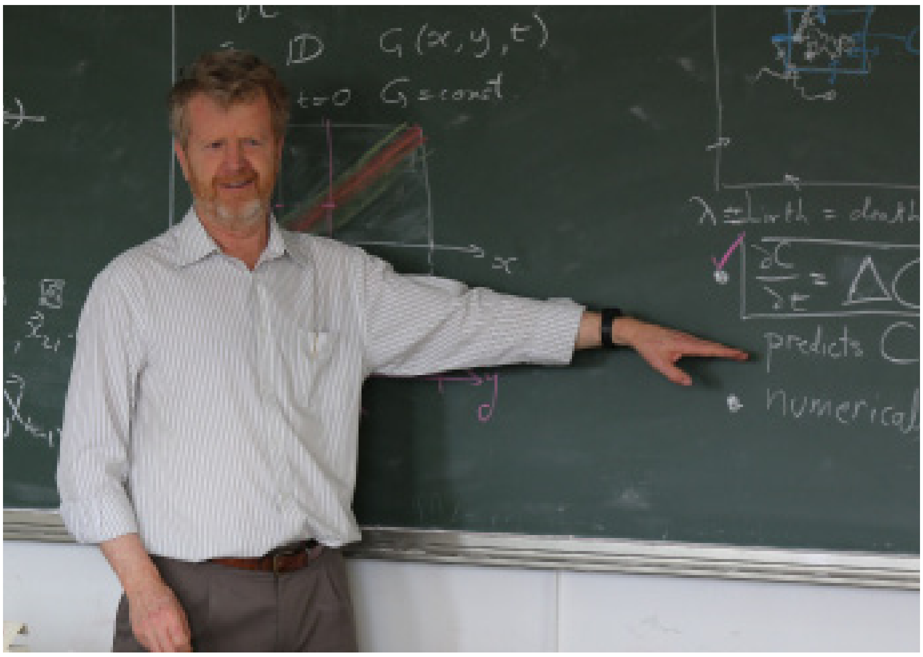


右一 何琨（华中科技大学）
右二 John Edward Hopcroft （康奈尔大学）

人物来访
Distinguished Visiting Scholars

自华中科技大学数学中心成立以来，已经先后有许多专家学者来此访问、作报告或者进行合作研究。其中包括（按姓氏字母排列）：步尚全（清华大学）、曹道民（中科院应用数学所 ）、Chen Xiaopeng（北京大学）、Chen Xin （University of Lisbon）、高洪俊（南京师范大学）、郭友中（中科院武汉分院）、Han Guangyue（The University of Hong Kong）、Jing Naihuan (North Carolina State University)、Li Jia （University of Alabama）、Li Tong（The University of Iowa）、 Li Xiaofan （Illinois Institute of Technology）、骆顺龙（中国科学院 数学与系统科学研究院）、Qiu Lingyun (University of Minnesota)、Ren Jian（广州大学）、王伟（南京大学）、王跃飞（中科院数学与系统科学研究院）、杨诗武 (University of Cambridge)、Yang Yisong（New York University）、Zeng Chongchun（Georgia Institute of Technology）、张晓轶（The University of Iowa）、张智民 （北京计算科学中心）、赵晓华（浙江师范大学 ）、周焕松（中国科学院武汉物理与数学所）、朱晨畅（Georg-August-University of Göttingen）等等。

华中师范大学李工宝教授（左二）来访数学中心，
丁烈云校长（左一）接见，并与数学中心主任段金桥教授（右一）
共同探讨数学中心发展问题



Anthony Roberts (University of Adelaide)
在数学中心作报告

右一 Jürgen kurths(Humboldt-Universität zu Berlin)
右二 Wu Jianglun(Swansea University, Wales, UK)
左一 许勇（西北工业大学）

数学沙龙
Mathematics Salon

2014 年 10 月 24 日，数学中心举办了第一期“数学沙龙”。此沙龙的活动形式是邀请一些知名的专家、学者、教授开展一系列富有知识性，趣味性，启发性和科普性的讲座，主要面向研究生、本科生和广大数学爱好者，旨在激发听众对数学的学习热情，以轻松愉快的方式普及数学知识。

首次活动邀请到了华中学者杨晓松教授作了题为《Talk about mathematics after visiting Gottingen》的精彩报告。杨教授分享了在数学界麦加——哥廷根的访问经历，讲述了哥廷根几位数学大家的求学历程，并对如何学好数学提出了一些建设性的意见。参与本次活动的还有部分青年教师，研究生以及本科生。其中数学中心访问学者新疆石河子大学王涛老师积极交流，向杨教授请教了怎样做好生物数学，让活动参加者都深受启发。

数学人物与事件
Mathematicians and Their Stories

Martin Hairer awarded the Fields Medal

Martin Hairer FRS (born 14 November 1975 in Geneva) is an Austrian mathematician working in the field of stochastic analysis, in particular stochastic partial differential equations. He is Regius Professor of Mathematics at the University of Warwick,having previously held a position at the Courant Institute of New York University.


Martin Hairer

Research

Martin Hairer is one of the world's foremost leaders in the field of stochastic partial differential equations in particular, and in stochastic analysis and stochastic dynamics in general. By bringing new ideas to the subject he made fundamental advances in many important directions such as the study of variants of Hormander's theorem, systematisation of the construction of Lyapunov functions for stochastic systems, development of a general theory of ergodicity for non-Markovian systems, multiscale analysis techniques, theory of homogenisation, theory of path sampling and, most recently, theory of rough paths.

Personal Life

Hairer is an Austrian citizen and fluent in French, German and English; he is married to the mathematician Li Xue-mei. (Martin Hairer and his wife Li Xue-mei attended the First International Conference on Random Dynamical System ,at the Chern Institute of Machematics ,Nankai University ,2009)His father is Ernst Hairer, a mathematician at the University of Geneva.

Awards and honours

Advanced Research Fellowship, EPSRC (2006–2011)
Editors' Choice Award, Macworld (2007)
Whitehead Prize, London Mathematical Society (2008)
Philip Leverhulme Prize, Leverhulme Trust (2008)
Wolfson Research Merit Award, Royal Society (2009)
Leverhulme Research Leadership Award, Leverhulme Trust (2012)
Fermat Prize, Institut de Mathématiques de Toulouse (2013)
Consolidator grant, European Research Council (2014)
Fellow of the Royal Society (2014)
Fröhlich Prize, London Mathematical Society (2014)
Fields Medal (2014)

数学人物与事件
Mathematicians and Their Stories

Women in Academic Science: A Changing Landscape

Three authors, Stephen J. Ceci (Cornell University), Donna K. Ginther (University of Kansas), Shulamit Kahn (Boston University), and Wendy M. Williams (Cornell University), have recently published an interesting article about women in academic science, in Psychological Science in the Public Interest , 2014, Vol. 15(3) 75–141. It may be relevant to the Chinese mathematics community, as we have now many women PhD students in mathematics.

Two of the authors,Wendy M. Williams and Stephen J. Ceci , also published an article "Academic Science Isn' t Sexist " written for general public, in the New York Times, on October 31, 2014.

This is a summary of the article:
ACADEMIC science has a gender problem: specifically, the almost daily reports about hostile workplaces, low pay, delayed promotion and even physical aggression against women. Particularly in math-intensive fields like the physical sciences, computer science and engineering, women make up only 25 to 30 percent of junior faculty, and 7 to 15 percent of senior faculty, leading many to claim that the inhospitable work environment is to blame.

Our analysis reveals that the experiences of young and midcareer women in math-intensive fields are, for the most part, similar to those of their male counterparts: They are more likely to receive hiring offers, are paid roughly the same (in 14 of 16 comparisons across the eight fields), are generally tenured and promoted at the same rate (except in economics), remain in their fields at roughly the same rate, have their grants funded and articles accepted as often and are about as satisfied with their jobs. Articles published by women are cited as often as those by men. In sum, with a few exceptions, the world of academic science in math-based fields today reflects gender fairness, rather than gender bias.

Moreover, in contrast to frequent claims that outright bias pushes more women out of math-intensive fields, we actually found a greater exodus of women from non-math-intensive fields in which they are already well represented as professors (like psychology and biology, where 45 to 65 percent of new professors are women) than from fields in which they are underrepresented (like engineering, computer science and physics, where only 25 to 30 percent of new professors are women). Our analyses show that women can and do prosper in math-based fields of science, if they choose to enter these fields in the first place.

数学人物与事件
Mathematicians and Their Stories

So if alleged hiring and promotion biases don’t explain the underrepresentation of women in math-intensive fields, what does? According to our research, the biggest culprits are rooted in women’s earlier educational choices, and in women’s occupational and lifestyle preferences.

As children, girls tend to show more interest in living things (such as people and animals), while boys tend to prefer playing with machines and building things. As adolescents, girls express less interest in careers like engineering and computer science. Despite earning higher grades throughout schooling in all subjects — including math and science — girls are less likely to take math-intensive advanced-placement courses like calculus and physics.

Women are also less likely to declare college majors in math-intensive science fields. However, if they do take introductory science courses early in their college education, they are actually more likely than men to switch into majors in math-intensive fields of science — especially if their instructors are women. This shows that women’s interest in math-based fields can be cultivated, but that majoring in these fields requires exposure to enough math and science early on.

In contrast to math-based fields, women prefer veterinary medicine, where they now constitute 80 percent of graduates, and life sciences, in which they earn over half of all doctoral degrees; women are also half of all newly minted M.D.s and 70 percent of psychology Ph.D.s. However, those college women who do choose math-intensive majors like engineering persist in them through graduate school and into the academy at the same rate as their male counterparts — again showing that women can and do succeed in math-based fields if they develop interest in them and commit to them.

Today’s story about women in math-based academic fields is clear. While no career is without setbacks and challenges, life in fields like engineering, physics, mathematics and computer science — when viewed by the numbers across the population of academics today rather than through the lens of testimonials and overgeneralized findings — is life with reasonable pay, flexibility to meet family demands, and the chance to make meaningful impacts on the state of knowledge and the next generation of talented young people. Academic science is a rewarding career for many, men and women alike. We are not your father’s academy anymore.

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本期介绍美国国家科学基金委员会（NSF）三个新的研究资助项目

Mathematical Sciences Innovation Incubator

Division of Mathematical Sciences (DMS) aims to enhance the synergistic relationships between the mathematical sciences and other NSF-supported disciplines through the Mathematical Sciences Innovation Incubator (MSII) activity. This activity encourages and supports new research collaborations among mathematical scientists and other scientists and engineers working in NSF-supported research areas of high national priority by:
* facilitating DMS co-review and co-funding of multi-disciplinary research collaborations involving mathematical scientists;
* providing leverage for investments of non-DMS NSF programs in projects that include mathematical scientists; and
* providing a uniform mechanism through which collaborative research teams involving mathematical scientists can request DMS co-review.

The ideas, tools, and language of mathematics and statistics play important roles in every area of science and engineering research supported by the National Science Foundation, and it is widely recognized that interactions between the mathematical sciences and other fields catalyze developments in both. The Division of Mathematical Sciences wishes to foster the participation of more mathematical scientists, from every area of mathematics and statistics, in such important interdisciplinary work. In support of this goal, the MSII activity provides funding to catalyze the involvement of mathematical scientists in research areas where the mathematical sciences are not yet playing large roles.

This activity emphasizes scientific research areas of high national priority that would benefit from innovative developments in mathematics and statistics. For example, modern communication, transportation, medicine, manufacturing, security, and finance all depend on the mathematical sciences. Success in meeting crucial challenges currently facing the nation in these areas will rest on advances in mathematical sciences research. Collaborative research projects involving mathematical scientists have the potential to transform the nation’s ability to respond to these and many other challenges.

Areas of national high-priority scientific research in fiscal year 2015 identified by the U.S. Office of Science and Technology Policy include:
* Advanced Manufacturing
* Clean Energy
* Global Climate Change
* Research and Development for Informed Policy-Making and Management
* Information Technology Research and Development
* Innovation in Biology and Neuroscience

Computational and Data-Enabled Science and Engineering Program

Advanced computational infrastructure and the ability to perform large-scale simulations and accumulate massive amounts of data have revolutionized scientific and engineering disciplines. The goal of the CDS&E program is to identify and capitalize on opportunities for major scientific and engineering breakthroughs through new computational and data analysis approaches. The intellectual drivers may be in an individual discipline or they may cut across more than one discipline in various Directorates. The key identifying factor is that the outcome relies on the development, adaptation, and utilization of one or more of the capabilities offered by advancement of both research and infrastructure in computation and data, either through cross-cutting or disciplinary programs.

The CDS&E program objectives are:

· Promote the creation, development, and application of the next generation of mathematical, computational and statistical theories and tools that are essential for addressing the challenges presented to the scientific and engineering communities by the ever-expanding role of computational modeling and simulation and the explosion and production of digital experimental and observational data.

· Promote and encourage integrated research projects that create, develop and apply novel computational, mathematical and statistical methods, algorithms, software, data curation, analysis, visualization and mining tools to address major, heretofore intractable questions in core science and engineering disciplines, including large-scale simulations and analysis of large and heterogeneous collections of data.

· Encourage adventurous ideas that generate new paradigms and that create and apply novel techniques, generating and utilizing digital data in innovative ways to complement or dramatically enhance traditional computational, experimental, observational, and theoretical tools for scientific discovery and application.

· Encourage ideas at the interface between scientific frameworks, computing capability, measurements and physical systems that enable advances well beyond the expected natural progression of individual activities, including development of science-driven algorithms to address pivotal problems in science and engineering and efficient methods to access, mine, and utilize large data sets.

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The CDS&E program in MPS explicitly addresses the distinct intellectual and technological discipline lying at the intersection of applied mathematics, statistics, computer science, and the core science disciplines of astronomy, chemistry, physics, mathematics, and materials research.

Astronomy: CDS&E encompasses those areas of inquiry where significant progress is critically dependent upon the application of new computational hardware, software, or algorithms, or upon the use of massive data sets. CDS&E encompasses fundamentally new approaches to large-scale simulation and to the analysis of large and heterogeneous collections of data, as well as research into the nature of algorithms and techniques that can be both enabled by data and enable more data-intensive research.

Chemistry: CDS&E encourages innovative and adventurous ideas that generate new paradigms at the algorithmic, software design and data acquisition levels in computational chemistry, simulations, chemical data analysis and cheminformatics, producing new approaches to gaining fundamental chemical knowledge and understanding.

Materials Research: CDS&E includes the creation, development, and application of computational tools, or the creation and application of novel techniques that utilize digital data in innovative ways to complement or dramatically enhance traditional computational, experimental, and theoretical methods to discover new materials, new materials-related phenomena, or advance fundamental understanding of materials.

Mathematical Sciences: CDS&E includes the creation, development, and application of the next generation of mathematical and statistical theories and tools that will be essential for addressing the challenges presented to the scientific and engineering communities by the ever expanding role of computational modeling and simulation on the one hand, and the explosion and production of digital and observational data on the other.

Physics: CDS&E includes ideas at the interface between scientific frameworks and computing capability that enable advances well beyond the expected natural progress of either activity, including development of science-driven algorithms to address pivotal problems in physics and efficient methods to access and mine large data sets.

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Directorate of Engineering: The CDS&E program in engineering recognizes the importance of engineering in CDS&E and vice-versa. Many natural and built engineering processes, devices and/or systems require high fidelity simulations over disparate scales that can be interrogated, analyzed, modeled, optimized or controlled, and even integrated with experiments or physical facilities.

Chemical, Bioengineering, Environmental and Transport (CBET): CDS&E in CBET includes the use of high performance and emerging computational tools and environments in advancing mathematical modeling, simulation and analysis to describe and analyze with greater fidelity, complexity and scale, engineering processes in chemical, biochemical and biotechnology systems, bioengineering and living systems, sustainable energy and environmental systems, and transport and thermal-fluids systems.

Civil, Mechanical and Manufacturing Innovation (CMMI): CDS&E in CMMI encourages research that meet the expectations of the Directorate of Engineering and include advancing mathematic modeling and simulation to describe and analyze, with greater fidelity, complexity and scale, as well as create and apply novel techniques that utilize digital data in innovative ways to complement or dramatically

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Research at Interface of the Biological and Mathematical Sciences Program

INTRODUCTION

The extraordinary growth of data-rich biology has created revolutionary opportunities for mathematically-driven advances in biological research. In this initiative, the National Institute of General Medical Sciences (NIGMS) and the National Science Foundation's Division of Mathematical Sciences (NSF/DMS) join together to promote research at the interface of the biological and mathematical sciences. The expertise of the DMS in the mathematical and statistical sciences, and of the complementary expertise of NIGMS in biological and biomedical research are expected to create new opportunities in quantitative biological research.

This initiative is designed to support research in mathematics and statistics on questions in the biological and biomedical sciences. A direct relationship between a biological application and the mathematical and/or statistical work is expected. Research teams that include scientists from both the life sciences community and the mathematical and statistical sciences communities are encouraged.

PROGRAM DESCRIPTION

The Division of Mathematical Sciences (DMS) within the Directorate of Mathematical and Physical Sciences (MPS) and the National Institute of General Medical Sciences (NIGMS) anticipate supporting research in the mathematical and statistical sciences with biological applications. Appropriate application areas are those currently supported by the National Institute of General Medical Sciences (see http://www.nigms.nih.gov/Research/).

Examples of areas of research that are appropriate under this competition include the following:

- Evolutionary or ecological population dynamics;
- Differentiation and developmental processes;
- Explanatory and predictive models of cellular behavior;
- Molecular and cellular networks;
- Novel and unique approaches to the prediction of molecular structure;
- Simulations of the human systemic responses to burn, trauma and other injury;
- New approaches to understanding system-wide effects of pharmacological agents and anesthetics, and their genetic and environmental modifiers.

These areas of research are examples only. They are not meant to be inclusive. Mathematical scientists, pure, applied, and/or statistical, and others capable of developing the mathematical and statistical tools envisioned are encouraged to apply. The work that is supported under this initiative must impact biology and advance mathematics or statistics. Thus, collaborations between the mathematical scientists and appropriate biological scientists are expected.

活动预告
Upcoming Activities

The International Conference on Recent Advances in Applied and Computational Mathematics will take place during May 29- 31, 2015 at the Center for Mathematical Sciences, Huazhong University of Science and Technology, Wuhan, China.

This workshop will also celebrate the 60th birthday of Russel Caflisch, who has made profound contributions to applied and computational mathematics, including applications of mathematics in fluid mechanics, finance, materials science, and plasma physics. Professor Russel Caflisch is the Director of the Institute for Pure and Applied Mathematics (IPAM), Los Angeles, USA.

简讯
Brief News

数学中心主任段金桥教授和国防科技大学黄建华教授的研究项目“非高斯噪声驱动的无穷维随机动力系统的动力学研究”获得国家自然科学基金委员会资助。项目批准号：11371367 ，资助金额 56.00 万元，项目起止年月： 2014 年 01 月至 2017 年 12 月。

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