

Sigma Xi Today

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Mark Holtzapple Wins First Chubb Award

How would you like to drive 1,000 miles between fill-ups and 50,000 to 100,000 between oil changes? Wouldn't it be great to have an engine so durable that, after a lifetime of driving, you could still pass it on confidently to your grandchildren?

The winner of Sigma Xi's first Walston Chubb Award for Innovation is working on just such an engine. Chemical engineering professor Mark T. Holtzapple at Texas A&M University is known for his creativity, especially in the realm of new technologies.

He will receive Sigma Xi's newest award during the Society's Annual Meeting and Student Research Conference, set for November 2-5 in Detroit. His Chubb Award Lecture is bound to go over big in the Motor City.

Holtzapple's research on super-efficient engines and converting biomass to cleaner-burning fuels holds great promise. The MixAlco process he developed converts everything from garbage to sewage sludge to sorghum and other crops into mixed alcohols that can be used as fuel.

In theory, his StarRotor engine, now under development, could be as much as 60 percent efficient—two to four times more efficient than today's conventional internal combustion engines. And it will be able to run on a variety of fuels, such as alcohol, diesel or even olive oil.

"The StarRotor engine produces almost no pollution," says Holtzapple, whose focus on every project is minimizing damage to the environment. "I really believe this is the engine we've all been waiting for."

"Manufacturers tell us they see a lot of 'paper motors,'" he continues, "meaning that they look good as a design,



Mark T. Holtzapple

but we'll soon have the data to back it up, then we can move forward."

Born in Enid, Oklahoma, in 1956, Holtzapple received his B.S. in chemical engineering from Cornell University and his Ph.D. from the University of Pennsylvania. After serving in the U.S. Army, he came to Texas A&M as an assistant professor in 1986.

He has won nearly every major teaching award the university offers and wrote a freshman-level textbook, *Foundations of Engineering* (with W.D. Reece), to excite students about engineering and to help lay a solid foundation for their future studies.

He is now a full professor, with 26 issued patents and numerous pending patents. In addition to engines and renewable energy resources, his research interests include space life support, air conditioning/refrigeration, water desalination and food processing.

Among other honors, Holtzapple has received the Texas A&M Ingenuity Award and the Presidential Green Chemistry Challenge Award from the U.S. Environmental Protection Agency and the American Chemical Society.

Sigma Xi Launches Affiliates Program

A new category of participation in Sigma Xi has been established to expand the Society's influence in the public sector. The Sigma Xi Affiliates Program is open to those who are interested in supporting the Society and its mission but who are not qualified, by virtue of research achievements or potential, for membership in the Society.

Affiliate categories are as follows:

Professional

Individuals who work in or have earned a degree in science or engineering and who support Sigma Xi's mission.

Friend

Individuals who support Sigma Xi's mission but who are not directly involved in science or engineering.

Student

Students who are taking a curriculum of science, technology, engineering or math and are interested in pursuing research careers.

Through the new Affiliates Program, Sigma Xi welcomes all those who support its mission, including teachers, technicians, clinicians, students and science enthusiasts.

Visit www.sigmaxi.org for information on dues rates and benefits.

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An Interview with Sigma Xi President James Baur

James F. Baur is president of Science Solutions Inc., which concentrates on joint projects with research groups of or related to the former Soviet Academy of Sciences. His experience also includes college physics teaching and fusion energy research. Baur lives in Charleston, West Virginia, and has been a Sigma Xi member for 44 years.

What are your goals during your term as president?

As we work to enhance successes and identify initiatives, I'd like us to take the long view, looking ahead to the year 2030. What should Sigma Xi's structure, reach and emphasis be 25 years from now? And what action should be taken along the way to attain a future worldview? Factors for consideration might include relationships with world science, humanitarian or governing organizations; communication techniques, membership refinements and perhaps even separate, semi-continental offices for Sigma Xi geographic divisions in Africa, the Middle East, Europe, Asia, Pacifica and the Americas, to list a few.

Would you elaborate on the Society's global dimension?

Sigma Xi's International Committee and the board of directors established the International Partner category of chapter-type local groups. The Sigma Xi Moscow Partner and Sigma Xi Georgia Partner have been approved and installed. More partners in Africa and Eastern Europe are in formation. I am advocating the formation of chapters from groups at Gulf of Aquaba (joint Jordan-Israeli research group), South Pole (Western group) and Antarctic Station (Russian affiliated group), and nascent groups I have visited and encouraged in Seoul, Beijing and Ulaanbaatar. The International Committee is hard at work in all aspects of this endeavor. Like science, Sigma Xi should be global and transcend national boundaries.



James F. Baur

How can Sigma Xi promote this global view?

Scientists and engineers in China, Mongolia, Kenya and many other countries cannot afford the normal Sigma Xi dues. The Society and the International Committee are heeding the will of our delegates at recent annual meetings to go global without subsidizing new chapters and members from our modest dues. I am encouraging that a Sigma Xi Global Fund be established with contributions from multinational corporations that do business and have an interest in fostering science in developing countries and regions. This would be a means to supplement reduced dues of members in chapters in their operational areas. Thus, many thousands of competent and deserving scientists from all over the globe could join, enlarge, enrich and enliven Sigma Xi.

As chair of the International Committee, I have participated in functions at the Moscow Partner and the Hungary Chapter. I have asked my colleagues there to help do a feasibility study for each place to host a Sigma Xi meeting. I envision a fun and unusual program, with special presentations on Russian or Hungarian science, as well as opportunities to absorb the aura, architecture and culture of Moscow or Budapest. Now that would be fun!

What other areas will have your attention?

I'd like to promote an increase in annual meeting attendance. Frequent chapter delegate attendance improves Society governance and greatly influences fruitful chapter activities. I favor exploring use of hotels with less expensive rooms and the trial use, at least, of a room-share list as a service to delegates to control meeting costs and increase attendance.

Increasing chapter membership is another priority. In those instances where chapters cannot be brought up to a critical mass of members, I advocate an effort to consolidate one or more chapters in the area to serve all Sigma Xi members there and to enrich the consolidated chapter with more members and institutional resources.

How would your suggested regional collaborations work?

Through local initiative and leadership. When three to six chapters collaborate on speakers, programs, open houses or poster judging, it offers a number of advantages, including increased attendance and promotion of companionship among the memberships of the individual chapters. Such consortia have worked successfully in Connecticut, Southern California and Arizona, among other areas.

Is there anything else you would like to add?

I also advocate an aggressive program to foster more open house activities, especially ones that bring local industry and government laboratories and their scientists, officials and facilities into the Sigma Xi movement. And I would especially like to implore members and officers to share ideas and speak their minds by calling or e-mailing the president, any director or the executive director. Sigma Xi would be the better for it.

Hix Among Annual Meeting Speakers

W. Raphael Hix is considered one of the most talented young researchers in theoretical nuclear astrophysics in the world today. His expertise is in nucleosynthesis.

Research in this area is complex and interdisciplinary, but the goal is simple: to determine the cosmic origin of the elements that make up our bodies and the world around us.

Hix is the recipient of Sigma Xi's 2006 Young Investigator Award. His award lecture will be among the highlights of the Annual Meeting and Student Research Conference in Detroit, to be held November 2-5.

A theoretical astrophysicist at Oak Ridge National Laboratory, Hix's interests include astronomical phenomena such as novae, supernovae, X-ray and gamma-ray bursts and stellar structure and evolution, as well as relevant areas in nuclear physics.

His work involves the theoretical study of violent stellar events, because the origin of the elements is inextricably linked to the lives, deaths and afterlives of stars. The elements of which we are made were cooked up inside stars and ejected into space in violent explosions before being incorporated into our solar system, our planet and our bodies.

He is pursuing the cosmic mechanisms by which elements are synthesized, melding the use of nuclear accelerators, astrophysics theory, information processing tools and high performance computers.

Sigma Xi Grants

October 15 is the next deadline for Sigma Xi Grants-in-Aid of Research. Undergraduate or graduate students in a degree program are eligible. Awards are made to support research in any field of science or engineering. Grant guidelines, an interactive application form and tips on preparing a successful application are available online at www.sigmaxi.org.

It is up to researchers like Hix to interpret and decipher the spectacular discoveries made by such satellite observatories as the Hubble Space Telescope and the Chandra X-ray Observatory.



W. Raphael Hix

"We live in an era full of discoveries of new types of exploding stars, new measurements of elements on the surfaces of the oldest stars and new information on the microphysics within our own Sun," according to Michael Smith, leader of the Oak Ridge Experimental Astrophysics Group. "Without the research Raph and others in his field do, we cannot pull these together into a coherent picture of our cosmic origins."

Hix is considered one of the foremost experts in nuclear astrophysics modeling. His publication record is remarkable for a young researcher, including pioneering papers in leading astrophysical, computational and physics journals.

He has also invested considerable time in mentoring students. Colleagues describe him as a gifted lecturer, able to communicate complex ideas succinctly and effectively to both professional and lay audiences.

Hix received B.S. degrees in both physics/astronomy and mathematics at the University of Maryland and his Ph.D. in astronomy at Harvard University. He has been on the research staff at Oak Ridge National Laboratory since 2004, and a member of the Theoretical Astrophysics Group there since 1997.

He is also an adjunct assistant professor at the University of Tennessee at Knoxville. He and his wife, Dacia, are the proud parents of Ronan and Lorelei.

Prizes & Awards Nominations Deadline October 1

Prestigious Sigma Xi awards honor excellence in science and engineering research and communication. Visit www.sigmaxi.org for details.

William Procter Prize

The Procter Prize recognizes a scientist or engineer who has made important contributions to research and demonstrated an ability to communicate that research to scientists in other disciplines.

John P. McGovern Award

The McGovern Award honors those who have made outstanding contributions to science and society.

Walston Chubb Award

The Chubb Award honors and promotes creativity among scientists and engineers.

George Bugliarello Prize

The biennial Bugliarello Prize recognizes a superior interdisciplinary essay, review of research or analytical article published in *American Scientist* magazine.

Young Investigator Award

This award recognizes researchers in the early stages of their careers whose contributions best exemplify the ideals of Sigma Xi.

Honorary Membership

Honorary membership is bestowed on those not otherwise eligible for membership in Sigma Xi, who have served science, or the Society, in a manner or to a degree that merits such recognition.

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Industry and Innovation Among Themes for Detroit Meeting

Industry, innovation and interdisciplinary investigation will be the focus of science sessions, award talks and poster presentations November 2-5 for the 2006 Sigma Xi Annual Meeting and Student Research Conference at the GM Renaissance Center in Detroit.

The annual meeting banquet at the world-famous Henry Ford Museum will give attendees special access to Buckminster Fuller's Dymaxion House among other exhibits. Visit www.sigmaxi.org for online registration.

This year's meeting will also feature half a dozen cutting-edge science sessions on Saturday afternoon.

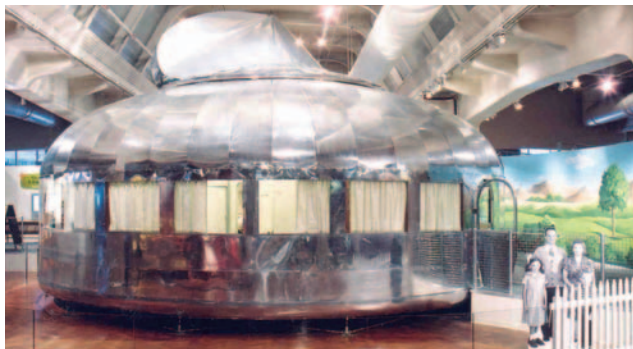
"In response to suggestions over the past few years, we've made a concerted effort to increase the amount and variety of real science that we offer as part of the optional programming," says Sigma Xi Executive Director Patrick D. Sculley.

All meeting and conference participants are invited to attend these sessions, which will be classroom-style presentations designed to stimulate discourse and debate.

At the annual Sigma Xi Student Research Conference, set for November 3-4, undergraduate and graduate students will present their research, attend career advancement workshops and participate in mentoring and networking activities, panel discussions and other events.

Research presentations by members and talks by Sigma Xi award winners will showcase outstanding researchers and science communicators.

Speakers will include Procter Prize winner **Susan Lindquist**, McGovern Award recipient **Alan Lightman**, Chubb Award winner **Mark Holtzapple** and **W. Raphael Hix**, winner of the Young Investigator Award.



R. Buckminster Fuller designed his Dymaxion House to be mass-produced, easily shipped and able to withstand a Kansas tornado. The Henry Ford Museum in Detroit, where Sigma Xi's annual banquet will be held this year, has one of the few prototypes. Photograph courtesy of The Henry Ford.

Lindquist and Lightman are at the Massachusetts Institute of Technology, and Holtzapple is at Texas A&M University. Hix is an astrophysicist at Oak Ridge National Laboratory.

Sigma Xi chapter delegates will attend educational sessions on leadership, chapter management and major issues facing the research community.

The following are among the chapter and science session topics:

Science in the Streets

Imagine neighborhood science festivals happening across the U.S. and beyond—all on the same day, at the same time! And simultaneously podcasting them! Imagine the effect this would have on getting science into our homes and into our daily lives. Such collaborations are already underway in Arizona, Florida, New York, Nigeria and elsewhere.

Sigma Xi Science Cafés

Science cafés bring together scientists and members of the public in accessible venues to discuss current scientific research, its findings, context, caveats and implications. This session will serve as a how-to guide for establishing successful cafés.

Investigating Brain Injury

Traumatic brain injury (TBI) is the leading cause of death and disability

among children and young adults. This session will span multidisciplinary research in developing better therapies and aftercare.

Advancing Cancer Research

The National Cancer Institute is speeding research progress by encouraging development of innovative technologies and by promoting interdisciplinary scientific collaborations with the private sector. This session provides an open forum to

discuss the prospects for innovations that will shape the future course of cancer detection and treatment.

Would you consider making a planned gift to Sigma Xi if we could show you how?

If you believe in Sigma Xi's role as a leading advocate for the value and promise of science, you can help support our programs with gifts other than cash. Your gift can make a difference.

Please call Kristen Greenaway, Director of Development, at 800-243-6534, e-mail kgreenaway@sigmaxi.org or return the reply card in the inside back cover.

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THE SCIENTIFIC RESEARCH SOCIETY