

**DEPARTMENT OF PHYSICS
WEST CHESTER UNIVERSITY**

Awards Ceremony and Colloquium



Induction of New Members into

Sigma Pi Sigma,

The National Physics Honor Society,

Awarding of

**THE ROBERT M. BROWN
ENDOWED SCHOLARSHIPS FOR PHYSICS,**

THE DR. MICHAEL F. MARTENS AWARDS

and

THE BENJAMIN FABER SCHOLARSHIP.

❖ Colloquium Presentation ❖

Dr. Natalia Dushkina

Professor of Physics, Millersville University of Pennsylvania

LESSONS FROM THE LIVING WORLD:

STRUCTURAL COLORS, COSMETICS AND FABRICS

22 April 2010

HISTORY OF SIGMA PI SIGMA

The beginnings of our Society date back to the year 1920. Several physics students and faculty members at Davidson College, Davidson, North Carolina, became convinced that there should be an organization that would serve as a means of recognition for superior scholarship in physics, that would bring those interested in physics into closer association, and that would encourage and stimulate them in their scientific work. They believed that an organization to achieve these goals also would bring about a closer cooperation between instructor and student.

Formal action was taken on December 11, 1921, when five students and four faculty members, meeting in the home of the head of the Davidson College physics department, formed a group which they named Sigma Pi Sigma. This organization functioned satisfactorily as a local honor society for several years. Then its members began to realize that the benefits they were deriving from the local organization might well be shared by others.

Thus, it was decided that Sigma Pi Sigma should become a national organization and on April 12, 1925 a modest expansion program was started. A second chapter was installed at Duke University a month later, and the third chapter was chartered at the Pennsylvania State College (now Pennsylvania State University) the following year.

The first national convention of the Society was held at Davidson College in 1928, with all of the existing five chapters participating. This convention resulted in an active and more extensive program of expansion that was promoted with vigor by the new national officers. Other colleges and universities soon accepted with favor the idea of a national physics society so that by 1930 there were 19 chapters and by 1941 there were 39.

A second burst of expansion activity followed the termination of World War II, and the chapter roll grew rapidly to 78 in the year 1950 and to 100 in 1959. The most rapid growth occurred immediately after the union of Sigma Pi Sigma and the American Institute of Physics Student Sections in 1968. As a result, Sigma Pi Sigma chapter membership increased from 170 in 1968 to 220 within a year. Sigma Pi Sigma has become truly national in scope with 416 active chapters at present, located in 47 of the states of the Union, plus the District of Columbia and Canada.

SYMBOLISM OF SIGMA PI SIGMA

The motto of the Society is $\Sigma\kappa\epsilon\upsilon\iota\zeta$ $\Pi\rho\omicron\sigma\tau\alpha\tau\eta\iota\zeta$ $\Sigma\upsilon\nu\epsilon\sigma\omega\zeta$ (Pronunciation: Skep-sis Praw-stah-tays Soon-éss-ch-öce.) This motto, translated from the Greek, is "Investigation, the Forerunner of Knowledge." From the first letters in the words of this motto is derived the name of the Society, Sigma Pi Sigma.

The symbolic key dates from the origin of the Society, having been unchanged since the first design was adopted. Its shape represents the historic standard voltmeter. Arched across the top, enclosed in a border, are the letters "Sigma Pi Sigma". In the apex of the key, in relief, is an incandescent lamp, connected to a dynamo in the center. Beneath the insignia is written the Greek word, $\Sigma\phi\iota\alpha$ (Pronunciation: So-fée-ah) signifying "knowledge," the goal of all scientific investigation.



$\Sigma\phi\iota\alpha$

The founders of the Society intended for this symbolism to portray three of the essential attributes of a scientist: Accuracy, Knowledge, and Creative Energy. The standard voltmeter is to symbolize accuracy, the lamp to typify knowledge, and the dynamo to portray the creative energy that is so essential in research.

THE MISSION STATEMENT FOR SIGMA PI SIGMA

Sigma Pi Sigma exists to *honor* outstanding scholarship in physics; to *encourage* interest in physics among students at all levels; to promote an attitude of *service* of its members towards their fellow students, colleagues, and the public; to provide a *fellowship* of persons who have excelled in physics. Sigma Pi Sigma's mission is not completed in the induction ceremony with the recognition of academic accomplishment. In the four dimensions of *Honor*, *Encouragement*, *Service* and *Fellowship*, the mission of Sigma Pi Sigma takes a longer view.

Honor

Sigma Pi Sigma is the Physics Honor Society. Through election to Sigma Pi Sigma, distinctive achievement and high scholarship in physics are recognized and celebrated.

Encouragement

By honoring high achievement in physics and upholding high standards for election into Sigma Pi Sigma, the Society provides an incentive for all physics students to rise to excellence. Sigma Pi Sigma is a source of encouragement to all students who study physics, whatever the ultimate level of performance achieved by the individual. Such encouragement ranges from promoting physics interest and science literacy in the general public, to challenging those who are pondering their potential for earning higher degrees. Sigma Pi Sigma urges its members to demonstrate this encouragement through personal service.

Service

With the recognition of accomplishment comes a responsibility to service at all levels. Nationally, Sigma Pi Sigma members can serve by helping to work for sound national science policies. Locally, Sigma Pi Sigma members can serve in community science education projects and liaisons, and in mentoring individual students. Such personal initiative provides opportunities for all members of the local community to learn more about physics, and provides visible testimony to the high standards of Sigma Pi Sigma membership. Our colleges, universities, and our Society know that when we become alumni, because we respect the personal struggle for excellence, we will support the generations of students that follow us. When the experience of Sigma Pi Sigma members is placed at the service of others at any level, then Sigma Pi Sigma touches more lives than may be counted by the number of its members.

Service towards others is an offering of fellowship. This is another mission that our honor society fulfills through its members.

Fellowship

The criterion of Sigma Pi Sigma membership is proven excellence in physics. There are no generational boundaries. The first members were inducted in 1921 and new members are added every year. Sigma Pi Sigma members represent many generations of experience and wisdom that can be focused on the matters that unite us.

In Sigma Pi Sigma, there are no professional boundaries. One finds all professions represented in the Sigma Pi Sigma membership. There are many practicing physicists among Sigma Pi Sigma members, but excellence in physics has opened many career options to our members. Through their lives, physics has enriched the world beyond the narrow scope of the physics community. Sigma Pi Sigma reaches beyond specific disciplines, uniting a diverse group of exceptional people who have shared in the culture and traditions of physics. With the common thread of this shared background in physics running through so rich a diversity of generations and professions, Sigma Pi Sigma promotes a spirit of community among its members and encourages them to offer their collective wisdom and perspectives in the service of the larger society.



Chapter No. 414

The Department of Physics

West Chester University of Pennsylvania

Robert W. Hawkes
Brent Kaplan
John David Presley
Russell K. Rickert
Harold L. Skelton
Frank A. Smith, Jr.
Stanley J. Yarosewick
Christopher T. Koh
Michael Magargee
Paul A. Medeiros
Michael Pentimall
Dawn J. Striker
Francis C. Aldridge 3rd
Christopher James Boyle
Jose Ferrer
Brooks Shawn Lunger
Brian William Raichle
Edward A. Saar
Alan M. Spangler
John Joseph Wagner
Stephen Christopher
George Engle
Andrew Zarynow
Timothy J. Bassett
Peter Cseke, Jr.
Peter N. Duli, Jr.
Daniel H. Greenawald

Anne C. Kane
Helen A. Weber
Nina Zarynow
Linda S. Bosbyshell
James B. Cracas
Drew Michael Feiner
Suljo Linic
Stephen Adrian McGill
Christopher Michael Myers
Amy Lynn Ventresca
Jeanette M. Lutz
H. Glenn Braksator
William C. Chess
William Wesley Peoples
Craig Evan Walter
Seth Joel Holladay
Brock King Lewis
Anna Malgorzata Mytyk
Matthew Breit
Anthony J. Daniels
James Weese
Nicholas Bartle
Mary E. Oksala
David P. Sears
Lisa A. Sweeney
Richard S. Woolf
Philip Castro

Naomi A. Barth
Kathleen Leduna
Christy E. Martin
Cynthia A. Cuddy
Louis H. Miner
Anthony J. Nicasastro
Gary J. Pascuzzo
William R. Passwaters
Matthew M. Waite
Thomas O. Melbourne
Matthew T. Shimer
Meira R. Elliott
Kevin B. Aptowicz
Alicia Derr
Mathew J. Zablocki
Miguel J. Abele
Steven M. Assalita
Jared Campbell
Maxwell Henderson
Nathan Kocher
Robert J. Thornton
Michael J. Hedrick
Justin D. Stahl
Shayna A. Wright
Thomas P. Haughey

THE ROBERT M. BROWN ENDOWED SCHOLARSHIP FOR PHYSICS

Robert M. Brown '38 established the Robert M. Brown Endowed Scholarship for Physics in December 1996. He received his B.S. degree from West Chester State Teachers College in 1938 and attended the University of Pennsylvania the following year on a full scholarship. Mr. Brown was motivated to establish the endowed scholarship for physics because of the deep respect and gratitude he has for the late Dr. Paul McCorkle, who served as a professor of physics at West Chester for many years. Mr. Brown served as a student laboratory assistant for Dr. McCorkle. Mr. Brown taught science for three years at the John Bassett Moore School in Symrna, Delaware before joining the Naval Ordnance Laboratory in Washington, D.C. as an associate physicist, designing and calibrating underwater ordinance. Following World War II, Mr. Brown was transferred to the Anaconda Company, where he was employed in various technical and managerial positions for 35 years. He is the inventor and holds a patent for an enameling machine employed in several of Anaconda's manufacturing facilities. The Scholarship has been established through cash gifts from Mr. Brown which have been matched by gifts from ARCO, the donor's former employer.

The Robert M. Brown Scholars

1998 Christopher Michael Myers	1999 Brock King Lewis Anna Malgorzata Mytyk	2000 Seth Joel Holladay
2001 Anthony J. Daniels	2002 Mary E. Oksala David P. Sears	2003 Philip Castro Mary E. Oksala
2004 Christy E. Martin	2005 Meira R. Elliot Matthew T. Shimer	2006 Alicia Derr Mathew J. Zablocki
2007 Joshua D. Davis Daniel J. Maraini	2008 Robert T. Virgin Maxwell Henderson	2009 Miguel J. Abele Michael J. Hedrick
2010 Andrew T. Clark Shayna A. Wright		

Notes on other scholarships:

THE DR. MICHAEL F. MARTENS AWARD: This award was established by a bequest of the estate of Dr. Martens, a faculty member of the Department of Physics. Dr. Martens was a long-time member of the Lions Club of West Chester which administers the funds for the award. The award is for achievement in Physics and is given to a Physics major in any of its three programs regardless of the number of credit hours taken in Physics. As a member of the Physics faculty Dr. Martens maintained high standards but sought any opportunity to encourage his students to continue to pursue excellence.

THE BENJAMIN FABER SCHOLARSHIP: The Benjamin Faber Scholarship was established in his honor by his family. Benjamin Faber was a dual major in Physics and Mathematics, and the scholarship alternates between the two departments. The scholarship is not only based upon achievement in Physics, but also for demonstrated collegiality and generosity to fellow students, a hallmark of Ben Faber's time with us. [Awarded by the Department of Mathematics in 2009.]

THE ROGER AND DIANE CASAGRANDE SCHOLARSHIP: The Roger and Diane Casagrande Scholarship was established by these two at the retirement of Dr. Diane Casagrande from the Department of Communications Studies. The scholarship is awarded to either Communication Studies majors or to those in the Physics/Engineering Program. Besides fulfilling a minimum GPA requirement, recipients of the scholarship must have a record of considerable campus and community service. [Awarded by the Department of Communication Studies in 2009.]

THE SCIENCE AND THEOLOGY AWARD: Established by funds awarded by the Center for Theology and the Natural Sciences in an international course competition to faculty in the Department of Physics and the Department of Philosophy, the Science and Theology Award is given to a student at West Chester University who has submitted the best essay which analyzes some aspect of an issue at the interface of science and theology. [Not awarded in 2009.]

**Induction of New Members into Sigma Pi Sigma,
The National Physics Honor Society of the American Institute of Physics**

Michael J. Hedrick, Justin D. Stahl, Shayna A. Wright,
Dr. Thomas P. Haughey

INDUCTION: Dr. Carolyn D. Sealfon

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Awarding of

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**THE ROBERT M. BROWN
ENDOWED SCHOLARSHIP FOR PHYSICS**

Andrew T. Clark, Shayna A. Wright

PRESENTATION: Dr. Robert J. Thornton

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**THE DR. MICHAEL F. MARTENS AWARD
FOR ACHIEVEMENT IN PHYSICS**

Michael J. Hedrick, Maxwell P. Henderson, Sean D. Martin, Ryan Roberts

PRESENTATION: Dr. Russell K. Rickert

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THE BENJAMIN FABER SCHOLARSHIP

Ryan Margolis

PRESENTATION: Dr. Anthony J. Nicastro



*Brief Biographical Sketch of our Colloquium Speaker,
Dr. Natalia Dushkina*

Dr. Natalia M. Dushkina earned her Ph. D. in Physics from the Bulgarian Academy of Sciences in 1993. Her professional interests include optics, holography and color formation, lasers, optical properties of thin-films, Physics pedagogy. Dr. Dushkina is an author of 34 scientific and popular science papers, one patent and two books, *Lasers and Laser Technologies* and *Handbook of Optical Metrology*, and presentations at 35 international conferences. She has more than 10 years of research experience, including six years of experience obtained in Japan and two years of work in US industry, and more than 10 years of teaching experience. She joined the Department of Physics at Millersville University, PA, in August, 2004, where she teaches general physics courses, optics and mathematical methods in physics. She came from Bowling Green State University, where she has taught general physics and optoelectronics.

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The Annual Physics Awards Ceremony

COLLOQUIUM

Thursday 22 April 2010

4 P.M. MERION ROOM 112

Light food and refreshments available beginning 3:30 p.m.

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INTRODUCTION OF COLLOQUIUM SPEAKER: Dr. Frank E. Fish, Department of Biology

Dr. Natalia Dushkina

Professor, Department of Physics, Millersville University of Pennsylvania

Lessons from the Living World: Structural Colors, Cosmetics, and Fabrics

ABSTRACT

The beautiful and brilliant colors in nature have intrigued and puzzled human beings for thousands of years. After briefly describing some of the most popular examples of adapting designs from nature, this presentation shall review applications of purely physical colors that originate from diffraction and interference of light from microstructures and thin films. For example, the opal effect and the beautiful and brilliant hues of some butterflies such as *Morpho sulkowskyi* will be reviewed. The physical principles behind the structural colors of *Morpho* species and the nacreous pigment which is the basis of the Shiseido's Infinite Color will be discussed, as well as some options to mimic the structural colors of *Morpho* species by high-quality self-assembled thin films. Sculptured thin films (STFs) and microstructures composed of spherical particles of different sizes exhibit super-hydrophobic and super-hydrophilic properties, which could serve as a prototype for self-cleaning and waterproof fibers and fabrics.

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