



# VOICES OF DISCOVERY // 2014-15

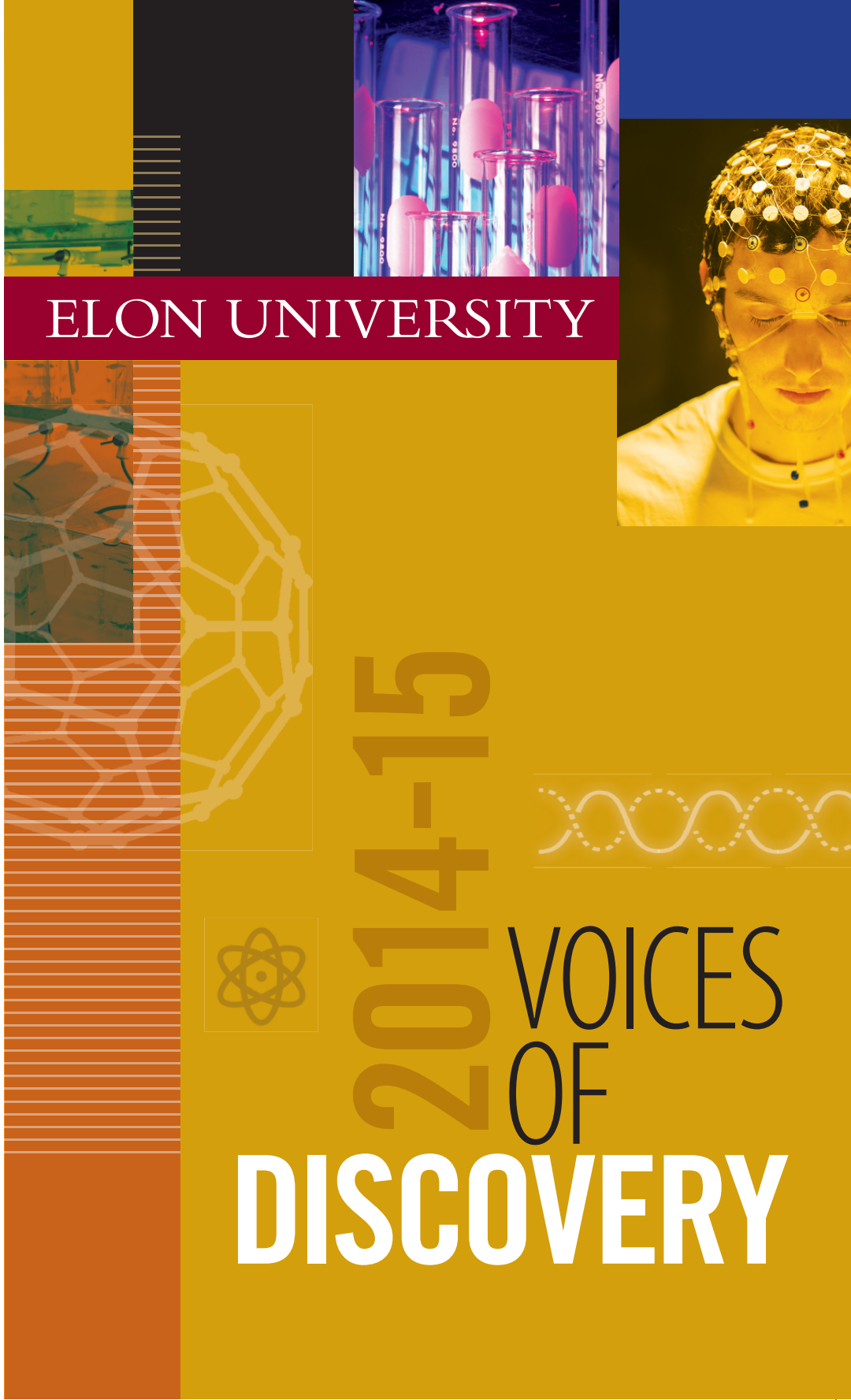
ELON UNIVERSITY

ELON COLLEGE, THE COLLEGE OF ARTS & SCIENCES

PO Box 398

Elon, NC 27244

Nonprofit Organization  
US Postage  
PAID  
Permit No. 1  
Elon, NC



# VOICES OF DISCOVERY



**T**he College of Arts and Sciences at Elon University is committed to engaging students and the community in the excitement and wonder of discovery. During the past two decades, scores of discoveries in molecular biology, atomic physics and computer technology have changed the face of science and brought dramatic changes to our world.

**The Voices of Discovery speaker series** brings to campus preeminent scientists and mathematicians who have left an indelible mark on the way we view the world. They share their remarkable experiences and perspectives with Elon students and the community. This series plays a fundamental role in the university's commitment to create a science-conscious community and to help students be informed citizens.

**Voices of Discovery** is just one element of Elon's efforts to provide outstanding science education. At the Dalton L. McMichael Sr. Science Center, students work in modern laboratories with cutting-edge research tools. They focus on discovery-based learning, undergraduate research and collaboration among the sciences, developing an appreciation for the scientific enterprise and how we acquire new knowledge.



## Elon and the Legacy of Rachel Carson



THURSDAY, APRIL 9, 2015  
WHITLEY AUDITORIUM  
6:30 P.M.

### **Robert K. Musil, Ph.D., M.P.H.**

Senior Fellow Scholar in Residence and Adjunct Professor, Center for Congressional and Presidential Studies, School of Public Affairs // Adjunct Professor, School of International Service, American University

**T**his year marks the 50th anniversary of the death of Rachel Carson, a scientist and author whose startling and still somewhat controversial 1962 book, *Silent Spring*, inspired public awareness of environmental issues and kick-started the environmental movement in the U.S. and abroad, contributing to the establishment of the Environmental Protection Agency. In her book, Carson made the case for a strong connection between environment and human health, and contributed to the emergence of the concept of sustainability or a balanced relationship between humans and the rest of nature.

Broadly trained in environmental health, literature and the humanities, Musil is recognized as an environmental leader who has influenced environmental thinking through several avenues. As a scholar, Musil's areas of interest are global climate change, helping people to be hopeful about the future and understanding how to effect political change. Musil has consulted with high-level administrators in Washington about environmental policy. He also was the longest-serving executive director and chief executive officer of Physicians for Social Responsibility, a long-standing advocacy group that focuses on prevention of nuclear proliferation, climate change and public health through clean environment. It was during his leadership that the group received the 1985 Nobel Peace Prize.

A prolific author, Musil's most recent book, *Rachel Carson and Her Sisters: Extraordinary Women Who Have Shaped America's Environment*, connects the Carson legacy to the much wider network of influential women scientists and activists who also contributed significantly to the environmental movement.

Musil, a two-time recipient of the Armstrong Award for Excellence in Radio Broadcasting, has also impacted the environmental and sustainability movements through radio broadcasting, serving as executive producer and host of "Consider the Alternatives," a public radio documentary series that ran for many years.

# The Sky is Not the Limit



THURSDAY, APRIL 2, 2015  
ALUMNI GYM  
3:30 P.M.

## Neil DeGrasse Tyson, Ph.D.

Astrophysicist and Frederick P. Rose Director, Hayden Planetarium, // Research Associate, Department of Astrophysics, American Museum of Natural History

**T**he partnership of FOX Broadcasting Company and the National Geographic Channel in producing the popular hit series “Cosmos: A Space-Time Odyssey” is a clear indication that science is slowly becoming more mainstream—and more cool. Of course, it helps to have a science rock star like Neil DeGrasse Tyson as the series host.

Tyson was captured by astronomy at about age 9 while spending time stargazing from the rooftop of his Bronx home, especially after a visit with his parents to the Hayden Planetarium in New York City. “The stars came out, and I was hooked. How could you not be?” he says.

Tyson’s curiosity and passion to learn about the workings of the universe led to earning a bachelor’s degree in physics from Harvard University and a doctorate in astrophysics from Columbia University. He then became the director of the Hayden Planetarium, the very same special place that helped to kindle his passion for astronomy and science.

As an astrophysicist, Tyson’s research interests include star formation and the structure of the Milky Way galaxy. He has authored 10 books, including *Death By Black Hole* and *Other Cosmic Quandaries*, and has written many articles. He has been the recipient of numerous recognitions and awards, such as the NASA Distinguished Public Service Medal and two presidential appointments related to determining national policy about aerospace industry and exploration.

Tyson is best known for promoting excitement about astronomy and science among non-scientists. Through his many popular writings, the hosting of televised science documentaries and providing significant interviews about science, Tyson has told the great stories that engage, enlighten and inspire curiosity about the grandeur and workings of the universe. He is considered a modern day ambassador on a mission to “transform how we think about science.”

# Catching the Nanotechnology Waves: a Nature-Inspired Convergence of Form and Function



MONDAY, SEPT. 15, 2014  
MCCRARY THEATRE  
7:30 P.M.

## Daniel J.C. Herr, Ph.D.,

Professor and Nanoscience Department Chair, The Joint School of Nanoscience and Nanoengineering, The University of North Carolina at Greensboro

**W**hat’s so special about the nanoscale? Just about everything. Nanoscience studies things or materials that are in the size range of about 1 to 100 nanometers. A nanometer is one-billionth of a meter or a bit smaller than the diameter of a DNA molecule. The amazing thing is that nanoscale-size materials exhibit different physical and chemical properties from the same materials on a larger scale. Nanotechnology studies the potential applications of nanoscale materials based upon their novel properties.

Inspired by nature, scientists are now looking at the many nanoscale processes that occur naturally in and on living cells, such as self-assembly, recognition and transport, as opportunities for applications in medicine, agriculture, industry, energy production and other fields.

Dan Herr is professor and chair of nanoscience at the Joint School of Nanoscience and Nanoengineering (JSNN) and director of Semiconductor Research Corporation’s Nanomanufacturing Sciences area. Herr’s doctorate is in chemistry, but his interests are broad and include oceanography, medicine, the arts and the natural world. A noted scholar and inventor and recipient of the 2005 National Medal of Technology, Herr’s current research interests include nanoagriculture, nanoenergy, bioelectronics and the demonstration of useful self-assembled biomimetic systems.

Known as a pioneer in collaborative, interdisciplinary nanotechnology research, Herr works in the nanoscale world where the convergence of form and function and the convergence of physics, chemistry and biology are obvious and interesting and where the emergence of nanotechnology is enabling not only new understandings of natural phenomena, but also the design of useful and diverse applications.

# Emerging Concepts in Chronic Traumatic Encephalopathy



THURSDAY, NOV. 6, 2014  
McCRARY THEATRE  
7:30 P.M.

## **Ann C. McKee, M.D.**

Professor of Neurology and Pathology // Director of Neuropathology Core,  
Boston University School of Medicine

**E**xperts estimate the number of sports-related concussions in the U.S. each year to be in the millions. Besides the immediate impact of concussions, neurologists are increasingly concerned about the long-term effects of these traumatic brain injuries on brain function.

Recently there has been much interest in chronic traumatic encephalopathy or CTE, a progressive neurodegenerative disease thought to be caused by repetitive head trauma and first described in the postmortem brains of boxers in the 1920s. With worsening symptoms frequently showing up later in life, the condition is currently only diagnosed at autopsy and associated with certain sports and professions, such as the military.

As a professor of neurology and pathology at Boston University School of Medicine, Dr. Ann McKee studies neurodegenerative diseases, including conditions associated with mild traumatic brain injury from contact sports and military service. She is interested in understanding mechanisms of neurodegeneration, both from acute and chronic head injury, and in associating the pathophysiology with associated symptoms.

McKee also directs the Neuropathology Service for the New England Veterans Administration Medical Centers and the Brain Banks for the Boston University Alzheimer's Disease Center. She is a prolific scholar, a frequent keynote speaker in her field and the recipient of numerous honors and awards, such as the Merit Award from the Veterans Administration, the Sports Legacy Institute Impact Award and the Ethos Award from the Institute of Sports Law and Ethics.

# Targeting Protein Trafficking: A New Approach To the Treatment of Alzheimer's Disease



MONDAY, MARCH 16, 2015  
McCRARY THEATRE  
7:30 P.M.

Co-sponsored by Phi Beta Kappa and Voices of Discovery

## **Gregory A. Petsko, Ph.D.**

Mahon Professor of Neurology, Weill Cornell Medical College //  
Tauber Professor of Biochemistry and Chemistry, Emeritus, at Brandeis University

**A**s the age structure of the U.S. and global populations continue to shift towards more older people, the frequency of neurodegenerative diseases associated with aging, such as Alzheimer's and Parkinson's diseases, is projected to rise, reaching what some would call epidemic proportions. The potential impacts of such a scenario on health care systems is alarming.

As a biochemist, Gregory Petsko's chief research interest is the three-dimensional structures of proteins in order to understand how enzyme catalysis works and how structural changes are associated with normal and abnormal processes in cells. As a professor of neurology, Petsko and his collaborators have focused more specifically on how protein structure relates to neurodegenerative diseases, such as Alzheimer's disease, the most common cause of dementia worldwide.

Alzheimer's disease is thought to be the result of the accumulation and aggregation of beta amyloid, an abnormal breakdown product of a normal membrane protein of neurons or nerve cells. The aggregated and misfolded beta amyloid forms the tangles and plaques that characterize brain tissue in Alzheimer's patients that, when progressive, spreads and disrupts normal brain functioning. Recent work suggests people with Alzheimer's have lower levels of another type of protein known as retromers—proteins known to play a role in the normal cellular recycling of membrane proteins.

Petsko and his colleagues, using the tools of protein structural analysis, are investigating ways to stabilize the retromers involved in recycling the beta amyloid precursor protein in order to reduce their accumulation in nerve cells. Results of studies with cultured nerve cells look promising and could potentially lead to the development of another avenue of drug therapy for Alzheimer's and possibly other protein-folding disorders.