

The **University of Michigan Department of Astronomy**
Exhibit Museum of Natural History
Student Astronomical Society
and **Michigan Center for Theoretical Physics** present

SCALES OF THE UNIVERSE

A distinguished speaker series

Media Kit

September-November 2007



Scales of the Universe

Scales of the Universe, a distinguished speaker series, will bring some of the foremost experts in the field of astrophysics to Ann Arbor. The series will be offered this fall on Friday nights at 7:30 p.m. in room 1800 of the Dow Chemistry Building, 930 North University Avenue on the U-M central campus in Ann Arbor.

Scales of the Universe examines what the universe is like on a variety of spatial scales ranging from the solar system to the entire cosmos itself. The lecturers will also focus on aspects of frontier research at each of the featured scales, giving a flavor of current astronomical studies in a variety of areas. The final lecture will feature the award of the U-M Astronomy Department's Orren C. Mohler Prize, for distinguished contributions to astronomy and astrophysics.

Please join us for the ultimate in armchair travel! A complete list of talks appears below.

Friday September 28	Taking the measure of our solar system	John R. Spencer Southwest Research Institute
Friday October 5	Our local microcosmos	Carl Heiles University of California, Berkeley
Friday October 19	Galaxies: Where space becomes time	Mario Mateo University of Michigan
Friday November 2	A rich and evolving tapestry of cosmic structure	Niel Brandt Pennsylvania State University
Friday November 16	Quarks to the cosmos: Connecting the smallest and largest scales	Michael S. Turner University of Chicago

Presented by the U-M Department of Astronomy, the U-M Exhibit Museum of Natural History, the U-M Student Astronomical Society, and the U-M Michigan Center for Theoretical Physics.

Telescope viewing and planetarium shows will be offered immediately following each lecture.

For more information, call (734) 764-0478 or (734) 764-3440 or visit www.lsa.umich.edu/exhibitmuseum or www.astro.lsa.umich.edu. For images, contact Dan Madaj at dmadaj@umich.edu or call (734) 763-4190.



Taking the measure of our solar system

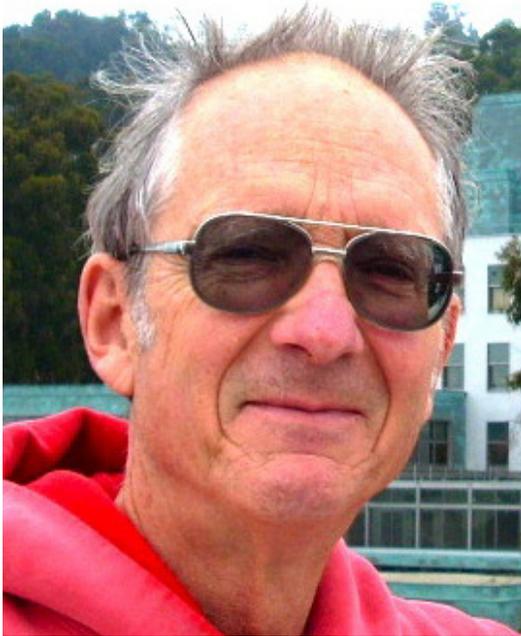
John R. Spencer

Southwest Research Institute

Friday, September 28 • 7:30 pm
1800 Dow Chemistry Building,
930 North University Ave., Ann Arbor

The sun's family of planets, where we make our home, is the place where we humans first learned to stretch our minds to encompass the vast scale of the universe. Spencer will describe how we learned just how big the solar system is, how we are now crossing those gulfs of space with robot explorers, and the strangeness these spacecraft have revealed in our exotic neighbor worlds.

John Spencer is a Staff Scientist at Southwest Research Institute's Department of Space Studies in Boulder, Colorado. A native of England, he earned a PhD in Planetary Sciences from the University of Arizona in 1987. He specializes in studies of the moons of the outer planets, particularly the four large "Galilean" satellites of Jupiter, using theoretical models, Earth-based telescopes, close-up spacecraft observations, and the *Hubble Space Telescope*. He has also published research on Mars, asteroids, Pluto, and Neptune's moon Triton, and he is a lead co-investigator on the New Horizons mission to Pluto and the Kuiper belt. Among various awards and prizes, the asteroid 7554 is named after him. More information on Spencer can be found at www.boulder.swri.edu/~spencer/.



Our local microcosmos

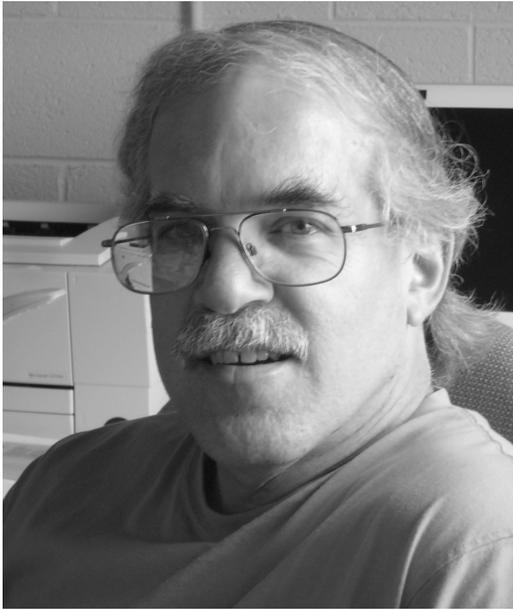
Carl Heiles

University of California, Berkeley

Friday, October 5 • 7:30 pm
1800 Dow Chemistry Building,
930 North University Ave., Ann Arbor

The Copernican view is that humanity doesn't occupy any special place in the Universe, so the local stars and gas should mirror the larger cosmos. Our local neighborhood is full of huge gaseous bubbles; our Sun lies inside a huge ancient bubble blown by a gigantic supernova explosion that interfaces to other large bubbles. Completely unexpected are the newly discovered gaseous objects that lie within: thin sheets of ultracold gas and ultradense kernels of hot gas. Heiles will discuss how and why these form, and what they tell us about the rest of our Milky Way galaxy.

Carl Heiles is Professor of Astronomy at the University of California, Berkeley. Born and raised in Toledo, Ohio, Heiles earned a PhD in Astrophysical Sciences from Princeton University. His areas of specialization include interstellar matter, radio astronomy, and numerical analysis. Among his research interests are observationally specifying the physical state of diffuse interstellar gas, and measuring the interstellar magnetic field. Heiles received the Heineman Prize of the American Astronomical Society and American Physical Society in 1988, and an honorary degree from Ohio University in 2006. More information on Heiles can be found at <http://astro.berkeley.edu/people/faculty/heiles.html>.



Galaxies: Where space becomes time

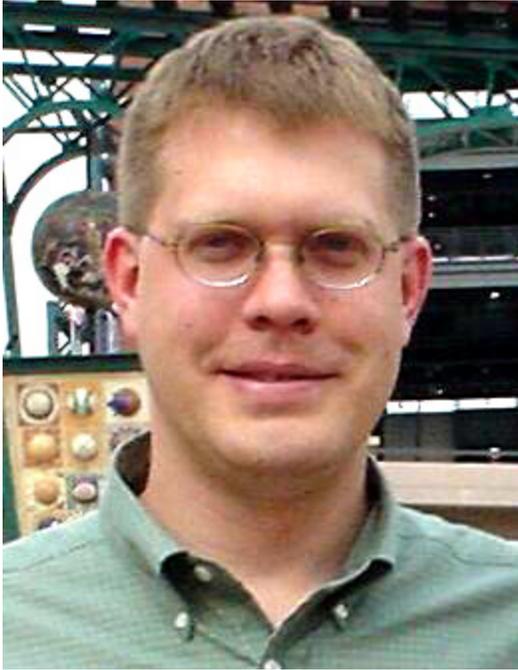
Mario Mateo

University of Michigan

Friday, October 19 • 7:30 pm
1800 Dow Chemistry Building,
930 North University Ave., Ann Arbor

Galaxies are so vast they challenge our fundamental notions about time and space, while offering a stage for a rich variety of astronomical phenomena. Galaxies evolve via dynamic, tumultuous events, interacting— sometimes violently — with their neighbors, yet constantly changing from within. These changes occur on temporal and spatial scales so far beyond the range of human experience that galaxies falsely convey to our transient eyes the appearance of eternal tranquility. Mateo will explore the remarkable properties of galaxies, providing a glimpse into key aspects of their lives, and noting some of the challenges we face to comprehend the scales of time and space that galaxies inhabit.

Mario Mateo is Professor of Astronomy at the University of Michigan. Mateo earned his PhD in Astronomy from the University of Washington, and sits on dozens of committees, including the Board of the Association of Universities for Research in Astronomy. He is an internationally recognized leader in the area of stellar populations and dark matter in dwarf galaxies. In addition to his scientific accomplishments, he designed and constructed several scientific instruments for use at major observatories like the Magellan 6.5m telescopes at Las Campanas Observatory, Chile. More information is available at www.astro.lsa.umich.edu/~mmateo/.



A rich and evolving tapestry of cosmic structure

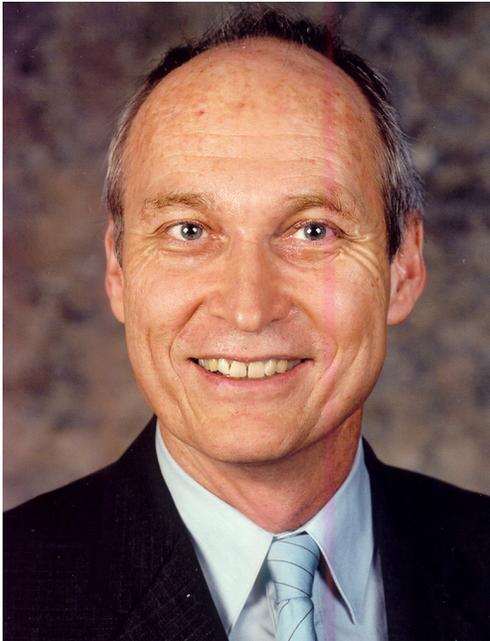
Niel Brandt

Pennsylvania State University

Friday, November 2 • 7:30 pm
1800 Dow Chemistry Building,
930 North University Ave., Ann Arbor

Galaxies and gas in the local universe are mostly located along filaments, leaving enormous voids. Brandt will describe how astronomers have heroically mapped these ultimate cosmic structures by measuring the precise locations of more than a million galaxies. These data, combined with powerful computer simulations, strikingly indicate that the seeds of these vast structures arose during the first instants after the Big Bang. These seeds were amplified by gravitational forces, acting consistently over 13.7 billion years of cosmic history, into giant concentrations of dark matter and gas. In these concentrations the gas could cool, condense, and fragment to form galaxies, stars, planets, and life.

Niel Brandt is Professor of Astronomy and Astrophysics at The Pennsylvania State University. Brandt earned his PhD in Astronomy from the University of Cambridge, United Kingdom. Brandt calls his research interests “adventures in the X-ray universe;” they include deep extragalactic X-ray surveys and high-redshift ($z > 4$) X-ray detections. He received the Newton Lacy Pierce Prize of the American Astronomical Society in 2004 and the National Science Foundation CAREER Award in 2000. Brandt is chair of the Science Collaboration on active galaxies for the Large Synoptic Survey Telescope. More information is available at www.astro.psu.edu/users/niel/.



Quarks to the cosmos: Connecting the smallest and largest scales

Michael S. Turner

University of Chicago

Friday, November 16 • 7:30 pm
1800 Dow Chemistry Building,
930 North University Ave., Ann Arbor

Orren C. Mohler Prize Lecture

There are profound connections between the smallest scales and the largest scales we can perceive. The largest objects in the Universe, galaxies and clusters of galaxies, began as quantum fluctuations of subatomic size; and observations of the microwave sky provide a window to the world of elementary particles and clues to the origin of space, time and the Universe. With this lecture, Turner will tie together the scales of the Universe and complete the lecture series.

Michael S. Turner is the Bruce V. and Diana M. Rauner Distinguished Service professor at the University of Chicago, and Chief Scientist and Director of Strategic Planning at Argonne National Laboratory. Turner earned a PhD in Physics from Stanford University, and is Chair of the Physics Section of the National Academy of Sciences. He is a co-founder of the Kavli Institute for Cosmological Physics, in Chicago.

Turner's research deals with the earliest moments of creation and exploits the

deep connections between the inner space of the elementary particles and the outer space of cosmology. He helped to pioneer the interdisciplinary field of particle physics and cosmology, and the monograph he co-authored with Edward Kolb, *The Early Universe*, is considered to be the handbook for the field.

Turner's most important contributions include explaining how the Universe reheats after inflation, showing how the largest structures in the Universe could have originated from sub-atomic quantum fluctuations, predicting precisely the density of ordinary matter using big-bang nucleosynthesis, advocating new forms of matter (axions and neutralinos) as the ubiquitous dark matter, using astrophysical observations to constrain the properties of elementary particles (axions and neutrinos), and predicting the acceleration of the Universe and articulating the dark-energy problem. Turner's pioneering research in particle cosmology has been recognized with the Warner Prize of the American Astronomical Society, the Lilienfeld Prize of the American Physical Society, election to the US National Academy of Sciences, an honorary degree from Michigan State University and the Caltech Distinguished Alumnus Award.

More information is available at physics.uchicago.edu/t_astro.html#Turner.



U-M Student Astronomical Society

The purpose of the **University of Michigan Student Astronomical Society** is to educate students and the public about astronomy, bring together undergraduate astronomy majors with professors and research opportunities, and further the interests of individuals who are not astronomy majors.

The U-M SAS holds regular meetings and public observing nights, sponsors lectures, provides tutoring in Astronomy classes, and participates in outreach programs for local primary and secondary school students.

The SAS website is www.astro.lsa.umich.edu/sas. E-mail: sas@umich.edu

The Orren C. Mohler Prize



The **Orren C. Mohler Prize** was established by the Department of Astronomy in 1986 and is awarded for excellence in research in astronomy and astrophysics. Three former Mohler Prize winners have also received Nobel or Crafoord Prizes.

Orren Cuthbert Mohler (1908-1985) was born in Indianapolis, Indiana and received his M.A. in 1930 and Ph.D. in 1933 from the University of Michigan. From 1933 to 1940, Mohler taught astronomy at Swarthmore College, and worked as an astronomer at the Cook Observatory of the University of Pennsylvania. In 1940, Mohler became an astronomer at the McMath-Hulbert Observatory at Lake Angelus near Pontiac, Michigan for the University of Michigan. He was awarded the Naval Ordnance Development Award for his contributions in military and development research. Mohler was director of the McMath-Hulbert Observatory (1961-1970), and Chairman of the Department of Astronomy and Director of the U-M Observatories (1962-1970).

Mohler's research led to the design and construction of the first astronomical vacuum spectrograph. Mohler had a great interest in preserving the past. He placed the 1854 Tiede astronomical clock into safekeeping at the Bentley Historical Library when the Detroit Observatory was vacated, and spent two years in the 1980s cleaning and polishing the meridian circle telescope to preserve it for future generations.

Thumbnail images

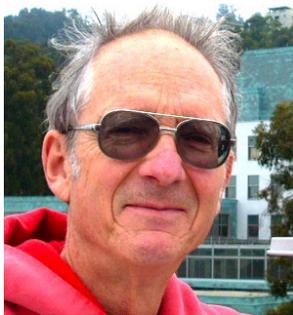
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Photo: NASA



John Spencer



Carl Helles



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