



ORION Trapezium

September 2018

Volume 45, Issue 9

Who are we?

ORION was founded in April 1974, by a group of scientists at the United States Department of Energy facilities in Oak Ridge, Tennessee. Our original goal was to perform correlated, instrumented observations of atmospheric and astrophysical phenomena. Since then, we have expanded in many directions, including optical and radio astronomy and instrument design. Have a look at <https://orioninc.org> and <https://orionastronomy.wordpress.com/meetings/upcoming-meetings/>

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Future Events

ORION Meeting

Wednesday, September 19

7:00 PM

Goff Health Sciences &
Technology Bldg., Room 104
Roane State Community College
Oak Ridge

TAO Public Stargazes

Saturday, September 1, 2018
Saturday, September 15, 2018
Roane State Community College
Tamke-Allan Observatory (TAO)
7:30 pm to 12:00 am
8:00 pm program
Look at
<http://www.roanestate.edu/obs/>

TAO Notes

ORION people are invited to arrive early (if announced on email) to prepare for evening viewing. Bring a telescope, red flashlight and munchies.
First time visitors – drive out before dark. Map available at www.roanestate.edu/obs.visit.htm

September 2018 Meeting

Wednesday, September 19, 7:00 PM, Goff Health Sciences and Technology Building, Room 104, Roane State Community College, Oak Ridge

Presentation: “*Human Space Exploration: The Merits of Avoiding Gravity Wells!*”

Speaker: Mark Uhran

Mark Uhran spent 28 years working with NASA on design, development and operation of the ISS. He retired from NASA headquarters in 2012 at the conclusion of the station assembly phase having completed his last 7 years as ISS Division Director. Uhran is currently engaged with ORNL on the ITER Project, where yet another global team is more than 50% complete in constructing a giant tokamak - a machine for sustaining a burning plasma of hydrogen isotopes - that aims to once and for all prove the feasibility of fusion energy for future electric generation.

Space stations and fusion reactors – this guy picks the hard ones! Don’t miss his well-informed perspective on overcoming seemingly insurmountable engineering challenges through global partnerships and a dogged spirit of relentless pursuit.

Abstract;

NASA, in cooperation with the space agencies of Canada, Europe, Japan and Russia, has safely and productively operated the International Space Station (ISS) since the first element was launched in 1998 and they are legislatively authorized to continue station operations through 2024. But, what will NASA’s global team of national space agencies do next in human space flight? The station’s useful lifetime is drawing to a close and plans for the next big international step in human space exploration are already being drawn up.

Mark Uhran will both inform and enthrall the Oak Ridge community with details about NASA’s current proposal to the White House to construct an orbital “*Gateway*” in the lunar region.

By the middle of the next decade, this habitable lunar orbiting platform would become the spaceport for a busy proving ground involving space vehicles and technologies that could enable a human mission to Mars in the 2030 orbital window. Nuclear thermal propulsion, additive manufacturing (aka “3D-printing”), and carbon fiber structures, among many other innovative technologies, could all come center-stage for this historic human endeavor. Opportunities for local and regional players to contribute are great owing to the Oak Ridge legacy in science and technology, and a symposium for continued discussions will be announced.

August 2018 Meeting

Wednesday, August 15, 7:00 PM, Goff Health Sciences and Technology Building, Room 104, Roane State Community College, Oak Ridge

Presentation: “Fusion Energy – Bringing Star Power Down to Earth”

Speaker: Don Sprong

Don Sprong is a scientist in the Plasma Theory and Modeling Group at Oak Ridge National Laboratory (ORNL). He received his PhD and MSE from the University of Michigan in nuclear engineering with a specialization in plasma physics. His undergraduate degree was from the University of Arizona also in nuclear engineering. He joined ORNL in 1975 and has worked on a variety of topics, including plasma transport, MHD, kinetic theory, plasma turbulence, Monte Carlo methods, fusion fuel cycles, stellarator design, and plasma processing for semiconductors. Don is a Fellow of the American Physical Society, recipient of the UT-Battelle science and technology award, Martin Marietta Energy Systems publications and author of the year awards; and has served two appointments as Visiting Professor at the National Institute for Fusion Science in Toki, Japan. He collaborates with scientists worldwide and his research has involved many visits to the major fusion laboratories in Japan, Europe, China, and Russia. Besides work, his hobbies include photography, astronomy, scuba diving, bicycling, hiking, and caving. Don and his wife, Janet Swift, enjoy traveling and visiting their daughter, Kate, who lives in Los Angeles.

Abstract;

Fusion fuels constitute the largest single terrestrial source of carbon-free stored energy. Since the declassification of fusion research nearly 60 years ago, significant progress has been made in the confinement, control, and scientific understanding of high temperature fusion-grade plasmas. We are now constructing the ITER tokamak device, which will provide the first tests of the ignited fusion state and demonstrate net power generation from the fusion of deuterium and tritium. Additionally, stellarators are achieving record-breaking parameters and offer attractive options for further fusion reactor optimization. Finally, a variety of new privately funded fusion start-up ventures have been forming and recent technological advances (high temperature superconductors, additive manufacturing) offer the potential for reductions in the size and cost of fusion reactors. Nevertheless, significant challenges remain in the areas of high temperature materials, protection of plasma-facing components, tritium breeding, and maintaining steady state ignited conditions. The motivations, history, current outlook, examples of fusion devices, and strategies for fusion energy will be presented.

ORION stargazes at Tamke-Allan Observatory

David Fields

Tamke-Allan Observatory (TAO) is an important astronomy facility in East Tennessee. Located on a remote hilltop and operated by Roane State Community College, TAO offers classes, public stargazes, and special astronomy events. Astronomy is a gateway to the sciences. Through astronomy, we recognize the relevance of biology and the necessity of physics and chemistry for understanding our place in the universe. Our universe offers our galaxy – the Milky Way – deep sky wonders in diffuse glow, jeweled clusters of stars, magnified glimpses of distant planets and their star-like moons, lunar craters, and elusive comets.

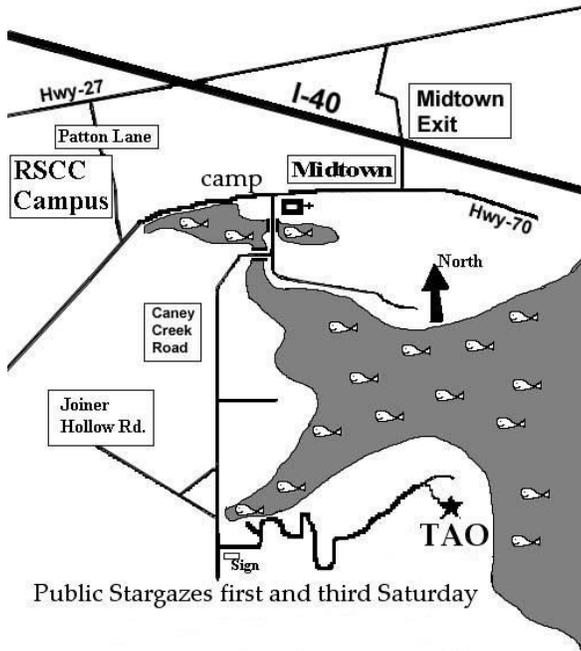
TAO has several telescopes, but two are especially useful. The favorite optical telescope for planetary viewing is our 8-foot refractor telescope, which offers an 8-inch diameter objective lens. Students and visitors enjoy this excellent telescope, which is housed in our large dome. A more impressive instrument—from the perspective of research and photography—is our 12-inch reflector telescope, a donation in honor of Marcus Morrow. It is computer controlled and offers spectacular vistas of more distant objects. Both telescopes routinely observe objects via light that is millions of years old.

TAO also has several radio telescopes that use radio waves to map and study our universe.

Tamke-Allan Observatory is an educational and research facility that supports the educational community in several important ways:

- The Observatory **supports college courses** in astronomy.
- **ORION Public Stargazes** are offered with no admission charge, at 7:30 PM on the 1st and 3rd Saturdays of each month. A lecture on astronomy and evening skies is offered at 8:00 PM. **Amateur astronomers** are invited to share their equipment and knowledge. Observing begins at dark at our public stargazes –bring binoculars, telescopes, red-light flashlights, cameras and cookies. If you'd like to bring a group to a stargaze, please check with the TAO Director, Dr. David Fields, at 865-927-5155.
- **Special events** are associated with significant astronomical events (eclipses, transits, and comets) and astronomy-related cultural events.
- TAO works with the Roane County community to actively **reduce unwanted illumination** from street lamps, car headlights and lighted signs. Because of their wasted skylight, our night skies are becoming less accessible. Only when we find an isolated mountain, such as the one on which the TAO is located, can we rediscover our astronomical heritage.

TAO is located 4 miles south of the Roane County Main Campus on a remote hilltop. From I-40 traveling west, take the Midtown exit (exit 350). Turn left off the exit ramp and go south 0.2 mile to US Hwy. 70. Turn right on US 70 and go 3.25 miles to Caney Creek Road (beside the church), just before Roane County Park. Turn left onto Caney Creek Road, then go 1 mile south and turn right across the bridge. Go 2 miles and continue straight through the 'Y' at Joiner Hollow Rd. Continue 1000 feet, turning left at the blacktop road at the Observatory sign. Follow the road up the hill for 0.9 miles to the observatory, coordinates 35.84 N and 84.37W.



For more information, please check our web sites, at <http://www.roanestate.edu/obs> and <http://www.roanestate.edu/TAO> or check our local ORION astronomy club website, at <http://orioninc.org> Photos from July 7.



More About ORION

ORION is an amateur science and astronomy club centered in Oak Ridge, TN that was founded in April 1974 by a group of scientists at the United States Department of Energy facility in Oak Ridge, Tennessee. We serve Oak Ridge, Knoxville, and the counties of Anderson, Knox, and Roane.

ORION's mission is to support science research, teaching, and amateur astronomy in East Tennessee, and therefore we are closely associated with and support TAO by volunteering to host their public events, share our knowledge of the skies with a variety of telescopes, and help provide intellectually stimulating programs at the observatory. ORION works to share the wonders of the cosmos and the culture of science to people from all walks of life.

Members are scientists, engineers, technicians, and others with varied talents and expertise. Over half have telescopes, many are amateur radio operators, and some have a technical interest in astrophotography.

ORION has working relationships with several organizations, including museums and amateur astronomy groups.

Membership is open to individuals who will actively contribute their time and ideas. Our annual membership dues are \$20.00 and student discounts are available.

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