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 / construction. Want to know more? See the last page.

Future Events:

**ORION Meeting** to be held at 1900 Hours (7 PM) on Wed. May 18, 2016

**Venue:** The Historic Grove Theater on Randolph Road, Grove Center Oak Ridge

**Abstract:** (on right)

**TAO Public Stargaze**

- **Dates:** Saturday, May 21, 2016
  Saturday, June 4, 2016

- **Where:** Tamke-Allan Observatory (TAO), Rockwood, TN, 37748, USA
  GPS: 35.80 North, 84.62

- **Time:** 7:30 pm - 12:00 am

- **8 PM Program:** Come and help show the skies to our visitors.

WHAT'S INSIDE...

**Page 1**  May Speaker- Mike Guidry

**Page 3**  Jennifer’s Column

**Page 5**  Family Night

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**Page 10**  President’s Perspective

**Page 17**  Parting Shots

MAY MEETING ANNOUNCEMENT

**Program:**

**Gravity Waves**

**Dr. Michael Guidry**

**The University of Tennessee**

**Oak Ridge National Laboratory**

**Abstract:** See Following Page

**TAO Notes:** ORION people are invited to arrive early (if announced on email) with telescopes to prepare for evening viewing and share snacks. Bring a telescope, red flashlight, and munchies. First time visitors drive out before dark!

**Map:**

http://www.roanestate.edu/obs/visit.htm

This month’s editors:

Roy Morrow and David Fields

Email Trapezium submissions to:
rmorrowb44@gmail.com
The recent announcement by the LIGO collaboration of the first direct detection of gravitational waves and the interpretation of the event (GW150914) as originating in the merger of two ~30 solar mass black holes has electrified the physics and astronomy community. If the claim withstands scrutiny, it represents one of the most important scientific discoveries of the past century. I will explain, in as simple terms as possible assuming a non-specialist audience, what gravitational waves are, how the wave was detected, and why GW150914 is of potentially enormous significance for both physics and astronomy.

Mike Guidry Bio

Mike Guidry earned his B.S in Chemistry from McNeese State University, and his Doctorate in Chemistry from the University of Tennessee. He currently holds a position with the University of Tennessee as a Professor of Physics and Astronomy; and is an Adjunct staff member with Oak Ridge National Laboratory in the Physics and Computer Science/Mathematics Division. He has an employment history that includes the Lawrence Berkeley Lab, the Niels Bohr Institute, the University of Liverpool and the University of Basel.
“Mike Guidry is the author of more than 200 journal publications and invited presentations, 3 published textbooks, and 3 textbooks in advanced preparation that address topics in nuclear physics, computational science, advanced educational technology, astronomy, astrophysics, cosmology, general relativity, the mathematics of symmetry in physics, elementary particle physics, relativistic quantum field theory, and condensed matter physics. He has been the lead educational technology developer for a 7 major college textbooks (with multiple editions) in introductory physics, astronomy, biology, genetics, and microbiology, and in projects as diverse as training K-12 teachers to use educational technology effectively and explaining the science behind weapons of mass destruction for emergency first responders. Recently he has developed an online course and conducted workshops in programming modern mobile devices for scientific and educational applications. His primary current research interests lie in development of new algorithms for solving large coupled sets of differential equations in scientific applications, understanding the mechanism for Type Ia supernovae, and developing new many-body techniques for understanding high-temperature superconductors and other strongly-correlated electron systems, and in developing new approaches to quantum Hall physics in graphene. He has won various teaching awards and is responsible for many Web-based and conventional initiatives introducing and explaining science to the public.” — (Michael Guidry, Personal Communication, April 28, 2016)

Our April speaker was Dr. Robert Compton an astrophysicist at the University of Tennessee and the Oak Ridge National Laboratory. His topic “On the Origin of the Universe and Life on Earth” provided an understanding of the universe arising from “nothing” and the development of “left handed” amino acids needed to seed the beginnings of life. David presented an Orion coffee mug to Dr. Compton

Davis and Robert Compton
What do you do when you realize that your first love is astronomy and all things related to it - physics, philosophy, theory, technology, literature, art, history, culture - yet your work and educational experience is, no pun intended, of another world? Astronomy is often seen as a graying hobby, reserved for intelligent and well-seasoned scientists, chemists, physicists and engineers. It is often an activity in which part of me feels I can have no impact, even though I receive pure enjoyment from being around it. Despite Carl Sagan’s famous declaration that “we are star stuff” I’m not sure that my background in or understanding of human physiology, exercise and disease prevention provides me with the proper credentials needed to share with the public the joy of my somewhat new-found love. My educational training is vastly different than the scientists that I often stand next to yet I can't help but be just as determined to share my passion for the skies with others, and find a way to help ignite school-aged children with a desire to learn more about the sciences. The determining factor, I’m finding, is often bolstered from thoughts of or encounters with random people who happen to cross my path as we do this thing called life (yes, that was a tribute to Prince). In the last month, there have been three such interactions for me: an encounter with the Huntsville Space Museum curator, a discussion about an unnamed football sportscaster (ahem - former University of Tennessee commentator John Ward), and an astronomy book I was reading in which I came across a lady named Agnes Clerke. All three illustrate that in many instances, what counts most when trying to convey a message is your determination, not your training.

Last month, I made a visit to the Huntsville Space Museum where happenstance allowed me a one-hour encounter with the museum curator. Ed was a walking encyclopedia with a seemingly infinite knowledge of everything in the museum: rockets and rocket fuels, missiles, space missions, astronauts, scientists, science and technology. His education? He was a Theater major. That was not a typing error, either. He majored in Theater. His passion from a young age, however, was for all things related to NASA. He taught himself much of what he needed to know, immersed himself in whatever information he could find, and used his communication and story-telling skills to bring even the most technically complex exhibits to life. I can assure you that astronomy and cosmology with him was most assuredly not a graying hobby on that day. Igniting the passion of others, I was reminded, is done through the telling of stories that individuals can relate to and correlating those same stories with the oddities of our current culture.

Another master of this concept is the former radio sports commentator, John Ward. His education and training for such an endeavor? Well, he received a law degree. My daughter, an avid fan of Tennessee football, once considered a career in sports broadcasting. She had a chance to meet John, and when she told him what she wanted to do with her life his one piece of advice was “study English”. What he meant was, study the English language. He had created a 30-year career doing something he loved by using words to draw a picture for thousands upon thousands of radio listeners. While some of those words were football lingo, the majority of them were carefully selected and used so that a broad base of people could ‘see’ what he was describing as his voice traversed across radio waves into our homes, cars and headsets. Communication was his hallmark. He reached many with only his voice, embedding lifelong memories of Tennessee football in the minds of people who were never in attendance for an actual game. As amateur astronomers, how often do we use common language to impart lasting
experiences and understanding into the minds of those around us? When the public stands around our telescopes or in our classrooms, how clearly do we communicate what they are seeing (or what we are capable of seeing) so that they can comprehend and appreciate the immensity of that which normally goes unseen?

I arrive now at the story of Agnes. Born in Ireland in 1842, Agnes Clerke was a woman with a gift of comprehending and communicating the science of astronomy to non-astronomers. So much so that by the time she was 43 years old she had written a book chronicling 30 years of astronomical history as she saw it happen. Her formal training, which allowed her to accomplish such feats? None. Zilch. Nadda. She received no degree in physics, math, chemistry or history. She never did research of her own yet she is – still to this day – known as a woman who played a very important role in parlaying the historical occurrences of technical, scientific research into a language that the general public could understand. Today, we might call this ‘popular science’.

Agnes was taught at home. She was reportedly fluent in languages and the classics, and was largely self-taught in math and science. While in Italy, she spent vast amounts of time in libraries educating herself in every way possible. Her father, an avid amateur astronomer, owned a 4-inch telescope through which she often studied Saturn and Jupiter as a child. She lived at an important time for astronomy, during which there was a transition from practical observation and astronomical theory to a new type of astronomy, which she coined ‘physical and descriptive’. No longer was it enough to observe and time orbits. Additionally, no longer was it enough to focus solely on theories to account for the causation of these orbits. It was a new time in astronomy, when information grew as a result of the addition of the spectroscope and better telescopes. As a deeper knowledge and understanding of the sun and the stars began to occur, she painstakingly documented the development of it all in her 1885 book titled A Popular History of Astronomy in the Nineteenth Century. Other than two prior articles, The Chemistry of Stars (1880) and Copernicus in Italy (1877), this work was her first major piece and it garnered her world-wide recognition and respect as an authoritative writer of science. In the book itself, she describes that it’s purpose “embodies an attempt to enable the ordinary reader to follow, with intelligent interest, the course of modern astronomical inquiries, and to realize…. the full effect of the comprehensive change in the whole aspect, purposes, and methods of celestial science introduced by the momentous discovery of spectrum analysis.” Translation - big stuff was happening in astronomy, and people outside of science needed to understand it. Later in the book, she would discuss the need to have the general public’s interest, in order to keep up the progress that was happening all around.

How do you get others passionate about your field? How do you inspire youngsters to follow suit and continue making discoveries? How can you get them to understand the significance of what they are seeing? Use common, every day language to bring your world to theirs. Agnes Clerke was very good at this. So good, that she penned other notable books: The System of the Stars (1890), The Herschels and Modern Astronomy (1895), The Concise Knowledge of Astronomy (contributor, 1898), Problems in Astrophysics (1905), and Modern Cosmogenics (1906). Many of these books are still referenced to this day. In addition, she provided 55 articles to the Edinburgh Review, and wrote for the Encyclopedia Britannica. In 1892, she became one of four women - up to that point in time - to receive an honorary induction into the Royal Astronomical Society (the others were Caroline Herschel, Mary Somerville and Mary Huggins). She is so well respected in the scientific community that in 1981 (one hundred thirty-nine years after her birth) NASA named a crater very near the location of the Apollo 17 lunar landing.
after her. I’m pretty sure no one I know will have a crater named after them, and I think I know some pretty smart people.

Rest assured, many of us non-scientists have a very useful place in the hobby of astronomy. Specific training in a classroom is not necessarily needed to promote a love of science. The information that we give needs to be accurate and up to date, but it can be obtained through a myriad of personal experiences, stories and studies. Curator Ed received no formal training for his job. Comparatively, neither did sportscaster John. By all accounts, Agnes was a mere 15 years old when she first began writing about astronomy. The way I see it, I’m in good company in this hobby, and so are you. Language counts. Connecting with people counts. Telling stories for the benefit of your audience counts. It’s not always rocket science. Well, most of the time it’s not.
Family Nights at TAO – April 16

Cloudy or clear astronomers and visitors will gather at TAO on family nights for stargazing and to enjoy the many *gastronomical* treats. On the **April 16** family night the food was once again exceptional with two huge trays of banana pudding provided by gastronomist Jim Long. There were many additional “healthy” body building treats including Margret’s decadent brownies, David’s homemade bread, fried chicken and lots of chips and drinks. Members and guests left with a definite positive attitude and a net positive calorie count.

Along with the exceptionally clear skies came the telescopes. In addition to the TAO 12 in. SCT and 8in. refractor, members brought five more telescopes. Roger Lane’s massive C-14 was the “big dog” of the telescopes and there were two C-8’s from Knoxville Observers operated by Carl Gerth and Don Eiler. Larry and Jerry each brought their Celestron C-11 scopes. DR operated the 12 in. Meade, while providing both commentary and humor for our visitors. David collected some visitors to watch a space station fly over.
The clear skies also brought out the visitors and other club members. I counted at least twenty five people at the observatory to hear David’s talk and to take advantage of the many telescopes and clear skies. ORION and KO can certainly be pleased with the TAO public outreach knowing that someone may now want to know more about the skies.

**Family Nights at TAO – May 7**

**David Fields**

Uh Oh. I had a bad feeling about May 7, since some of our most reliable amateur astronomers (Roy, DR and Gerald) had plans to go to the Tennessee State Star Party at Fall Creek Falls State Park. The skies were predicted to be beautiful and clear, so Cindy Whaley and Scout Troop 103 called and planned to come and learn some constellations. So anticipating a wonderful evening, a big crowd and competing astronomy activities but few astronomers – what to do?

Fortunately it worked out great, with Jennifer, Roger, George, Shawn and Larry bringing their scopes, my offering a program and operating the big refractor, and everyone cooperating with the classroom programs and with all the food. Jim brought 2 quiches and some coconut cake, which somehow combined to contribute to the TAO alien visitor food art. That was just the beginning, since we also had homemade bread, lots of sweets, and some juices and coffee. Here’s the alien food part:
With help from Jennifer and Roger, and comments from 2 Johns, I welcomed the scouts and visitors – altogether about 30 people packed into the classroom. That’s Roger on the right of this classroom photo, and the Scouts greatly enjoyed his talking with them about astronomy.

The outside activity under clear skies (till 2230h) was enjoyable, with lots of scopes out. Shawn and Pam were doing astrophotography, which went well.

**Tennessee State Star Party at Fall Creek Falls State Park**

The event was held May 6-7 at Fall Creek Falls State Park and was hosted by the Cumberland Astronomical Society. This is always an opportunity to meet astronomers from around the South while enjoying great food and good lodging at the Park’s lodge.

We learned about the 3 year effort the Monique Johnson and the staff at Pickett State Park spent acquiring the first Southeastern Dark Sky Certification from the IDA. A large effort was required to not only retrofit the Park’s lights to cut-off fixtures, but to gain support of the surrounding communities. An observing field was opened and electrical power run. Monique noted that Certification can be lost if the dark skies are not protected.
Noted astroimagers Craig and Tammy Temple provided an informative presentation on image processing. They are known for high quality published images taken using setups in their driveway. I asked if they had an observatory and the answer was “no”. Their talk centered on image processing with Craig doing the software processing and Tammy providing the artistic influence.

This year we were treated to a Friday night of low humidity and clear dark skies. The observing field had at least 20 telescopes with 4-5 set up for imaging. I understand the Park intends to get an IDA certification. The contrast was very good allowing the Red Spot of Jupiter to be a bit “red” in Jerry Calia’s 11in. Celestron SCT. With my 8 in. scope, M13 looked like a sphere of diamonds. DR had his giant binoculars and showed people Jupiter, the Beehive, and other celestial treats. We stayed until about 3 a.m.

What do we see during the day? Have a look…

“The Imaging Machine”, is a 10 in. f4 Schmidt Newtonian telescope on a Paramount equatorial mount. The camera looks like an SBIG with color filter wheel and off axis guider. I Could not locate the owner, but want to show the level of sophistication present at TSSP.

Three ORIONites waiting for dark where they will all look better!
Where to schedule our Oak Ridge Sidewalk Astronomy Events?

We all agree that we need to plan some fun summer events under the city skies with telescopes, food, and people. I’ve done a survey of light pollution at 10 Oak Ridge sites, and have concluded that Grove Center, Jackson Square, and the Marina may be the best we can find within the city. Actually Grove Center is a good site only if we can avoid some of the streetlights. (Or perhaps rise above them?)

I ranked 10 Oak Ridge sites based on numerical values for the following criteria:

1. Number of people expected: For occasional events, the number will be much higher. The highest number entered was 30, but on special occasions, the number may be in the hundreds or over 1000.
2. Quality of interaction: People strolling by in a quiet mood under peaceful skies will probably want to see some celestial features - moon, planets, stars, etc - so we’ll have a high quality stargaze. People in a hurry and under bright streetlights, won’t be interested in a Stargaze, and we’ll have low quality – give it a low numerical rating.
3. Food: If there is fast food, everyone will have fun. More fast food gets a higher rating.
4. Sky Quality (measured value), in magnitudes per square arc second (mag/as2). High values indicate darker skies. A Sky Quality Meter\(^1\) was used. The scale is non-linear and for comparison, a new moon sky at TAO is about 21.5 mag/as2.

These are late-night photos of Grove Center (Left), and WalMart (Right). The Grove site is still too bright, but with a Theater crowd and food, it is much friendlier than the WalMart parking lot. Sky Quality Measurements, Bortle Class, and NELM Comparisons

\(^1\) http://www.unihedron.com/projects/darksky/
Sky Quality is described here in mag/arcsec$^2$, and this is related to the Bortle$^2$ Class, which most amateur astronomers read about, and to the Naked-Eye Limited Magnitude (NELM). Here’s how the three scales relate:

<table>
<thead>
<tr>
<th>Bortle Class</th>
<th>Title</th>
<th>NELM</th>
<th>Approx. SQM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Excellent dark-sky site</td>
<td>7.6–8.0</td>
<td>21.7-22.0</td>
</tr>
<tr>
<td>2</td>
<td>Typical truly dark site</td>
<td>7.1–7.5</td>
<td>21.5-21.7</td>
</tr>
<tr>
<td>3</td>
<td>Rural sky</td>
<td>6.6–7.0</td>
<td>21.3-21.5</td>
</tr>
<tr>
<td>4</td>
<td>Rural/suburban transition</td>
<td>6.1–6.5</td>
<td>20.4-21.3</td>
</tr>
<tr>
<td>5</td>
<td>Suburban sky</td>
<td>5.6–6.0</td>
<td>19.1-20.4</td>
</tr>
<tr>
<td>6</td>
<td>Bright suburban sky</td>
<td>5.1–5.5</td>
<td>18.0-19.1</td>
</tr>
<tr>
<td>7</td>
<td>Suburban/urban transition</td>
<td>4.6–5.0</td>
<td>18.0-19.1</td>
</tr>
<tr>
<td>8</td>
<td>City sky</td>
<td></td>
<td>4.1–4.5</td>
</tr>
<tr>
<td>9</td>
<td>Inner-city sky</td>
<td>4</td>
<td>&lt;18.0</td>
</tr>
</tbody>
</table>

We have little to celebrate, since from the table and from measurements made for preparing this article, most of these Oak Ridge sites have worse light pollution than inner city sites. But we are examining only these city sites, and the goal is to choose which might offer conditions that are good for sidewalk astronomy, not which has the best sky for deep sky objects.

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Data and Ranking for the Proposed Oak Ridge Stargaze Sites for New Moon conditions

This is the first ranking of Oak Ridge sites, with a new moon and very few clouds. “Occ” suggests that the number of persons shown is representative of normal crowds. Occasional crowds will be larger.

<table>
<thead>
<tr>
<th>Site</th>
<th>Friendly</th>
<th>Sky</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number expected</td>
<td>People 1-6</td>
<td>Food 1-5</td>
</tr>
<tr>
<td>Grove Center (nolights)</td>
<td>30</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Grove Center (FRONT)</td>
<td>30</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Jackson Square (Fountain)</td>
<td>25</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Jackson Square (lot)</td>
<td>15</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Starbucks</td>
<td>20</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Melton Lake (Marina)</td>
<td>30</td>
<td>5</td>
<td>1(^4)</td>
</tr>
<tr>
<td>Wal Mart Lot</td>
<td>40</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Schools, AMSE</td>
<td>30</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Children’s Museum</td>
<td>30</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Civic Center field</td>
<td>10</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Haw Ridge Park</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Oak Ridge sites vary greatly, with Haw Ridge (illuminated by skyglow from Knoxville and Oak Ridge) being the darkest but with almost no people, WalMart (lights and oppressive glare and busy people), and Jackson Square, Starbucks, the Marina and Grove Center with more light pollution, but people who are willing to stop and look at the sky.

\(^4\) Sometimes (special events), food is available, and this value is 4
\(^5\) For special events, this value is 9-10. Parking may be a problem.
The “relative calc.” number is the product of the values for Number Expected, People, Food, and Sky. From this a normalized rank was calculated. Then the table was reordered to show the highest-ranked sites first, and the others in decreasing order.

The rankings vary greatly through the summer so this comparison is an oversimplification. For example, Melton Lake (Marina) can go from a ranking of 2.5 to about 10 for special events, where the number of people and availability of fast food contribute to the higher rating.

The best we can do is to choose carefully which site offers the best combination of factors on a particular date.

**Discussion**

The rankings are just estimates – only the Sky brightness values are measured. Nevertheless, the rankings demonstrate the relative value of these different sites. Grove Center, the Marina, Jackson Square, and Starbucks are most attractive. The Melton Lake Marina has a better sky, and only rates lower when there is no food.

For special occasions, Grove Center and the AMSE site (when they are hosting a school) have large numbers of students and we need to rank them highly.

Grove Center ranks highly, but only if telescopes are used away from the lights. Sky measurements labeled “Grove Center (FRONT)” are in the relatively dark area at the South corner of the Theater. Sky measurements labeled “Grove Center (nolights)” were taken in the shadow of the Northwest side of the building.
Data for the Proposed Oak Ridge Stargaze Sites for Full Moon Conditions

For full moon measurements, the Sky Quality Meter was pointed 40 degrees from the moon position. Thus skyglow was important, but not direct moonlight.

<table>
<thead>
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<td></td>
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<td>1</td>
</tr>
<tr>
<td>Wal Mart Lot</td>
<td>40</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Schools, AMSE</td>
<td>30</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Children’s Museum</td>
<td>30</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Civic Center field</td>
<td>10</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Haw Ridge Park</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

These data showed higher light levels than on the New Moon nights, but the conclusions are not significantly different from those reached with New Moon data. The normalization calculation used the same values in both tables, to permit comparisons between New Moon and Full Moon Conditions.

Can we find a site better than those examined?

Certainly we can find occasional special occasion sites that are better. Secret City or Concert crowds, are examples. The numbers here are misleading, since a relatively small fraction will use telescopes.

6 This number rises to 9-10 during special events. Access and parking may be a problem.
Nevertheless, this is a select fraction, with interest in astronomy, and we should avail ourselves of such events.

Another possibility is to persuade the city to let us encourage astronomy for the citizens and students of the city. We might ask that Grove Center and Jackson Square lights be dimmed for Sidewalk Astronomy.

A final consideration is that we might build a classy city astronomy site. This photo is a panoramic view from the roof of the Grove Theater, scanning clockwise, East to West. It shows a relatively unobstructed sky, with a view that is shaded from most of the nearby streetlights. The other half of the scan, showing the more northerly sky, is almost as good.

This photo is taken above the streetlights, and benefits from shading by the building roof. Consider how a nighttime view would show the celestial dome from above the city lights. What an opportunity it would be for Oak Ridge to have this become a city observing site!
Parting Shot(s)

Shawn Harrison imaged the M3 globular cluster during the April 7 Family Night

M3 Globular Cluster 4x300 sec., SN6 telescope and SBIG STF 8300C CCD CAMERA

M3 a beautiful globular cluster located in Canes Venatici and is a favorite target for amateur astronomers to observe and to image. It was discovered in 1764 by Charles Messier and has become one of the most studied globulars due to the large number of variable stars. At magnitude 6.3 it ranks second only to M13 as the favorite Northern Sky globular cluster. M13 is 34 ly distant, 90 ly in diameter, and contains an estimated 500,000 stars.

Here’s what Pam Whitfield was watching -- Markarian's chain (9x 300s subs).
The Transit of Mercury
A transit of Mercury occurred May 5 with just about every amateur in the US observing and imaging this rare celestial event. Unfortunately most of the day was clouded out here preventing viewing and imaging this event. There was a small window of semi-clear skies about 11:30 and I got a few minute view but no image. Vicente Diaz imaged from Lenoir city and reported once the clouds thinned out a bit at around 11:30am he was able to clearly see Mercury thru his 80mm refractor (mounted on a Meade LX200). He setup a camera to take photos every 20 seconds thru the LX200 at f6.3; took about 700 frames but only a fraction were usable due to the clouds.

A Mercury transit is a rare occurrence and occurs 13 times each century. The last transit was 2006 and the next one will be 2019. For comparison a Venus transit occurs in pairs with a century separating each pair.

Here’s a photo of the Mercury (small dot at the end of the arrow) transit by Vicinte Diaz, in Knoxville. The arrow was added by one of the editors. The upper feature is a sunspot.
Shawn Harrison captured the following image of Mercury crossing the Sun about 1 p.m. May 9, with a bit more magnification (from Solway area).

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.

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Linda Fippin
David Fields
Bob Edwards
Noah Frere
Roger Lane
Jennifer Hartwig
Roy Morrow
Joe White

Officers:
President: David Fields
Vice President: John Mannone
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Treasurer: Noah Frere
Editor: Roy Morrow
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Videographer: John Preston