



ORION Trapezium

January 2017 Volume 44, Issue 1

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.

What's Inside

January 2017 Meeting and Program	2
November 2016 Speaker	2
President's Perspective	3
TAO Events	4
Outreach and Education	4
Parting Shots	5
About ORION	9

Future Events

ORION Meeting

Wednesday, January 18, 2017
1900 hours (7 pm)
The Historic Grove Theater
Randolph Road
Grove Center, Oak Ridge

TAO Public Stargazes

Saturday, January 21, 2017
Saturday, February 4, 2017
Roane State Community College
Tamke-Allan Observatory (TAO)
7:30 pm to 12:00 am
8:00 pm program

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

January 2017 Meeting and Program

Presentation Title

The Total Solar Eclipse of August 21, 2017 over the United States

Abstract

This presentation will cover different aspects of the total solar eclipse that will take place on August 21, 2017, over the continental United States. Weather prospects and places to observe the eclipse in East Tennessee will be discussed. Also, pictures of past eclipses and locations for future eclipses will be presented.

Speaker Bio



Juan Carbajo is an eclipse chaser and experienced traveler who has gone to remote locations of the world to observe 12 total solar eclipses and several annular eclipses. The last total solar eclipse he observed was over the Svalbard Islands, near the North Pole, on March 20, 2015. Dr. Carbajo works at Oak Ridge National Laboratory on thermal-hydraulic and safety aspects of nuclear reactors. He has been involved in the design of space nuclear reactors cooled by potassium and in modular and advanced reactors cooled by liquid salts. He holds a Ph. D. in Nuclear Engineering from the University of Maryland.

November 2016 Speaker

Bogdan Vacaliuc from the Spallation Neutron Source at the Oak Ridge National Laboratory gave a very interesting presentation on recent advances in electronics and computer technology that have expanded the opportunities for citizen scientists to make contributions in radio astronomy



Bogdan Vacaliuc receives an ORION mug in appreciation for his presentation from President David Fields

President's Perspective

January 2017 - David Fields

January and February events – looking ahead to August 21

January brings us the January 18 ORION meeting. Dr. Juan Carbajo will discuss the coming solar eclipse. There will be a board meeting at 6 PM, before the general meeting.

The big observing event thus far has been the Quadrantid meteor shower – most of us saw only clouds. Not to worry, since it's better to have clouds now than during the August 21 solar eclipse. How's that for faulty logic? But January is not over, so we may yet have surprises.



February may bring crazy weather, but there's a Penumbral Lunar Eclipse on Feb. 11. Not a bad thing for an interesting radio astronomy experiment if someone has a high-resolution radio telescope to watch lunar cooling at 12 GHz.



Now look ahead to August 21. In addition to the amazing visual experience, there is a lot of fascinating radio astronomy that could be done. Anyone interested?



TAO Events

The first public stargaze of 2017 was cancelled due to the frigid weather and dangerously icy conditions on the road up to TAO. The next scheduled stargaze will be this coming Saturday, January 21. The current weather forecast shows continued unseasonably warm temperatures, but, unfortunately, a likelihood of rain. Nevertheless, the classroom will be open for presentations and discussions.

Outreach and Education

ORION Vice President, John Mannone, gave an invited presentation via Skype at the International Conference on Computer, Electrical and Communication Engineering in Bengal, India. John has kindly provided this summary of his talk

This is a debriefing of a talk I was invited to present to Techno India University, Bengal, India at the International Conference on Computer, Electrical and Communication Engineering. As a distinguished speaker, I was slated to be the first presenter at 9 AM India time on December 17. The 30-minute lecture, via Skype, was called "Spectral Analysis of Antenna & Detector Signals for College Science Courses and Amateur Astrophysics Research" Sadly there were some technical problems; however, the delegation of scientists, faculty and students enjoyed my recorded lecture and PowerPoint. The abstract was a bit ambitious, but a goodly amount was at least mentioned and several areas were explored in depth. The talk showed how the Fast Fourier Transform (FFT), with a deliberately-nothing-fancy application (Microsoft Excel), is an inexpensive approach to data analysis. Some examples that were highlighted are as follows: (1) FFT of sunspot data discloses more than the obvious 11-year periodicity and the less obvious 90-year periodicity in the solar cycle. It also reveals the equatorial solar rotation. (2) Electromagnetic signals obtained from amateur radio astronomy set-ups instruct on many levels. (2a) Time series of HF signals from a *RadioJove* system reveal solar and Jupiter storms, but their spectral indices testify to the nature of the radio emissions—thermal or synchronous. (2b) Extraterrestrial HF signals are also probes of the ionosphere (e.g., plasma bubble detection). (2c) Similarly, VHF terrestrial signals can probe the ionosphere for evidence of solar flares (or anything else). Using a *SuperSID* system, Sudden Ionospheric Disturbances (SIDs) can be seen by anyone with this simple equipment. But by looking at the fluctuations in frequency space, other things might be seen. The author found support for gravity acoustic waves in the ionosphere. (3) High-energy signals, such X-rays and gamma rays, can only be detected outside our atmosphere, but require space-borne detectors. However, amateurs have access to professional data, which can be spectrally analyzed. (3a) The interaction of coronal mass ejections with the solar wind was revealed by magnetic fluctuations in the *ACE* data. (3b)

FFT of the soft gamma ray bursts detected by the *Rhessi* probe showed a magnetar rotation period in close agreement with professional data. (3c) From the spectral analysis of *Swift* data (together with Wanda Diaz's sonification), unexpected features of the X-ray fluctuations of EX Hydrae (a cataclysmic variable), raised interest in the professional community.

Parting Shots

Metamorphosis of a Large Telescope

On June 22, 1916 a massive lightning storm occurred over the Arizona Sky Village. Data revealed the storm lasted some 30 minutes with cloud to ground strikes every few minutes. I was at the Grand Canyon Star Party and on return discovered the Meade 16 in. telescope mounted in my observatory was inoperable. Even though everything was unplugged a strike on the ground near the observatory took out all the mount control electronics. My neighbor noted the lightning strike and said the storm "parked" a while over my house and there was no direct strike on the observatory. I am very glad to have specific policy covering the telescope and the insurance company paid for part of the damage.



The picture above shows the 16 in. telescope in the observatory on the original fork mount in 2007. Meade quit manufacturing the RCX telescope in 2010 and soon after stopped all support, repair and parts supply. RCX owners were left to fend for themselves! Not good customer relations to say the least!

Much of the control electronics in the mount was damaged leaving the only option to get another mount! Easier said than done since the telescope, all associated guide scopes, cameras and wide field imaging scope weigh over 100 pounds. I bought a used Paramount ME found on Astromart and began the process to remove the RCX optical tube assembly (OTA) from the forks.

The Paramount with a 150 pound load capacity can easily carry everything. With the original RCX fork mount all scope functions such as slewing, focusing and collimation were controlled through the hand paddle. All of these functions were lost when the telescope was "deforked". An analog control board that allows control the focusing and collimation was installed. Telescope control and pointing is now done through the Software Bisque Sky6 planetarium program through a computer. Camera and auto guiding remains unchanged and is done using the Star Shoot auto guider and Canon EOS utility program through the computer.

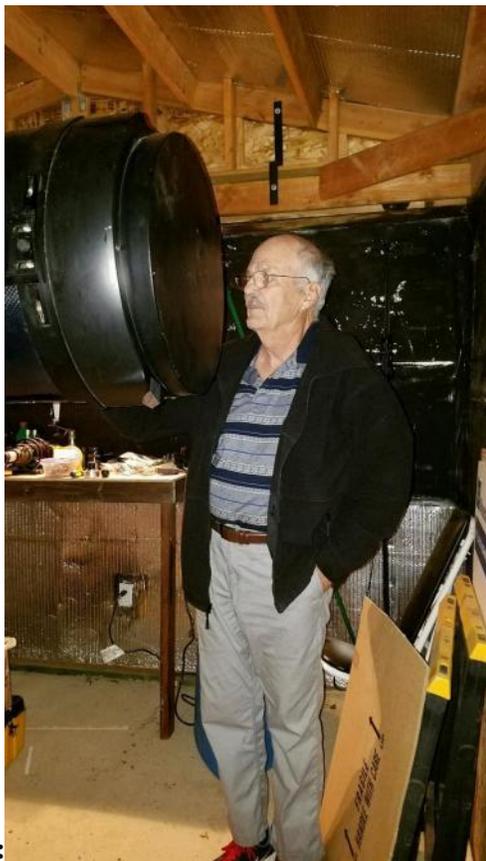


The RCX OTA weighs 70 pounds and requires two people to place it on the Paramount. My neighbor modified the pier by welding on a plate that mated with the Paramount base. The picture above shows the Paramount attached to the modified pier.

The 16 in. telescope is shown below mounted on the Paramount in the roll-off roof observatory. The Borg astrograph and guide scope will be mounted piggy-back on the 16 in. optical tube. Each of the four counterweights weighs 20 pounds.



When I left ASV in December, the pointing accuracy using Sky6 and the auto guiding seemed to work just fine. More work is needed to refine the polar alignment and this will be done during a return trip in March. As a parting shot consider the following picture:



A 16 in. telescope is indeed **BIG!** - but it does not **BITE!**

Astrophotography Presentation at KO



At the January 2017 Knoxville Observers meeting, Djerdj Srdanov gave a very nice talk about his experiences getting started and making progress in astrophotography. He discussed the equipment needed, setup procedures, photo acquisition and post-processing using photo stacking software. Here he is demonstrating how to align the mount and telescope.

Note: The editor is soliciting astrophotographs or other astronomy-related images from local club members for inclusion in the *Trapezium*. These images will also be used on the ORION webpage, www.orioninc.org. Readers are encouraged to submit images to Roy Morrow at morrowb44@gmail.com and to Linda Fippin at ljfippin@att.com.

As always, the editor welcomes contributions to the *Trapezium* from club members. Articles need to be submitted to Roy and Linda by the second Wednesday of the month, i.e., one week before the monthly ORION meeting, which is on the third Wednesday of the month.

You may have noticed that the volume number of the *Trapezium* made a sudden jump from Volume 7 to Volume 44. This was done to reflect the continuous existence of ORION since its formation in 1974, although the newsletter title *Trapezium* is of more recent vintage

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.

Board:

Bob Edwards

David Fields

Linda Fippin

Noah Frere

Jennifer Hartwig

Roger Lane

John Mannone

Roy Morrow

Joe White

Officers:

President: David Fields

Vice President: John Mannone

Secretaries: Linda Fippin, Bob Edwards

Treasurer: Noah Frere

Editor: Roy Morrow, Linda Fippin

Programs and Publicity: Jennifer Hartwig, John Latham

AV Coordinator: Bob Williams

Videographer: John Preston