



# ORION Trapezium

April 2017    Volume 44, Issue 4

## 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

April 2017 Meeting and Program	2
March 2017 Speaker	3
President's Perspective	4
TAO Events	7
Outreach and Education	8
Parting Shots	8
About ORION	10

## Future Events

### ORION Meeting

Wednesday, April 19, 2017  
1900 hours (7 pm)  
The Historic Grove Theater  
Randolph Road  
Grove Center, Oak Ridge

### TAO Public Stargazes

Saturday, May 6, 2017  
Saturday, May 20, 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](http://www.roanestate.edu/obs.visit.htm)

## April 2017 Meeting and Program

### Speaker



**Harold A. (Hal) McAlister** is Regents' Professor Emeritus of Astronomy at Georgia State University and founder and Director Emeritus of the Center for High Angular Resolution Astronomy (CHARA) at GSU. He received his PhD in astronomy from the University of Virginia in 1975 and spent the next two years as a postdoc at Kitt Peak National Observatory pioneering and establishing the technique of speckle imaging of binary stars. He then spent the next 38 years as a faculty member at GSU where he played key roles in establishing his department's doctoral program in astronomy and its Hard Labor Creek Observatory, located 50 miles east of Atlanta. He retired from Georgia State in 2015.

McAlister's primary focus was CHARA, which designed, funded, and now operates an optical interferometric telescope array that produces the highest resolution images of stars ever made (see <http://www.chara.gsu.edu> for more information about this facility). The CHARA Array is located on the grounds of Historic Mount Wilson Observatory in the Angeles National Forest of Southern California. From 2002 until 2014, McAlister also served as Director of Mount Wilson Observatory and CEO of the Mount Wilson Institute, a non-profit corporation that operates MWO under an agreement with its owner the Carnegie Institution of Washington.

The author or co-author of some 250 scientific papers, McAlister has also written a number of articles for the non-specialist in addition to editing several conference proceedings. During the 2009 Station Fire his blog attracted several hundred thousand hits while the fire threatened to destroy Mount Wilson Observatory for nearly a month. His reports during the fire crisis were compiled in the 2010 Amazon Kindle ebook *Diary of a Fire. Sunward Passage*, which he started in order to pass time sitting on airplanes flying from his home base in Atlanta to Los Angeles, is his first novel. He is presently writing an article for *Sky and Telescope* magazine entitled "Forty Years of Seeing Double" in addition to pursuing several other book projects to occupy his retirement. He and his wife Susan live in Decatur, Georgia when they are not off exploring in their new motorhome.

Editor's Note: All astronomers in the East Tennessee area should plan to attend Dr. McAlister's lecture. His contributions to astronomical research and teaching will be appreciated by all.

### Presentation

#### *Seeing the Unseen with the CHARA Array*

### Abstract

Historic Mount Wilson Observatory is home to the world's highest resolution optical telescope – Georgia State University's CHARA Array, a collection of six 1-meter aperture telescopes operating at visible and near-infrared wavelengths. The Array uses the principles of long-baseline interferometry to achieve resolutions capable of not only resolving the surfaces and shapes of stars but also seeing spots, gas and dust disks, and close stellar companions. In terms of angular resolution, the facility functions as a single, giant telescope some 330 meters across, and – with its limiting resolution of 200 micro-arcseconds (0.0002 arcseconds) – CHARA is providing details about stars, including images of them, never before directly seen. It is the most scientifically productive such instrument ever built in the US and possesses

angular resolution that exceeds the European Southern Observatory's Very Large Telescope Interferometer. This talk describes how the CHARA Array works and will give selections from the rich smorgasbord of CHARA's scientific results during its first decade of operations. The speaker will also touch on his retirement activities as a biographer and novelist.

For this presentation I will take an approach different from past talks. This presentation will be interactive with the audience taking an active part. The slides will be structured to encourage questions. So please do not sit in the back row! Go and read the NASA data and image releases about the Trappist system so you can add to the discussion. This will be a learning experience for all of us!

## March 2017 Speaker

Roy Morrow presented an interesting talk "The Trappist Exoplanets: An Interactive Presentation" Discovery of this unusual planetary system of seven rocky planets orbiting a cool red dwarf star was announced in February, 2017. The first two planets were discovered by a small 24-inch automated Belgian telescope named Trappist, after the famous Belgian Beer. The other five were discovered using NASA's Spitzer space telescope. The entire Trappist solar system will fit inside the orbit of Mercury with all seven planets being rocky, including four in the habitable zone that could contain water in some form. Kepler and the James Webb telescope (when launched) will further characterize this system.



The Formal Cup Ceremony

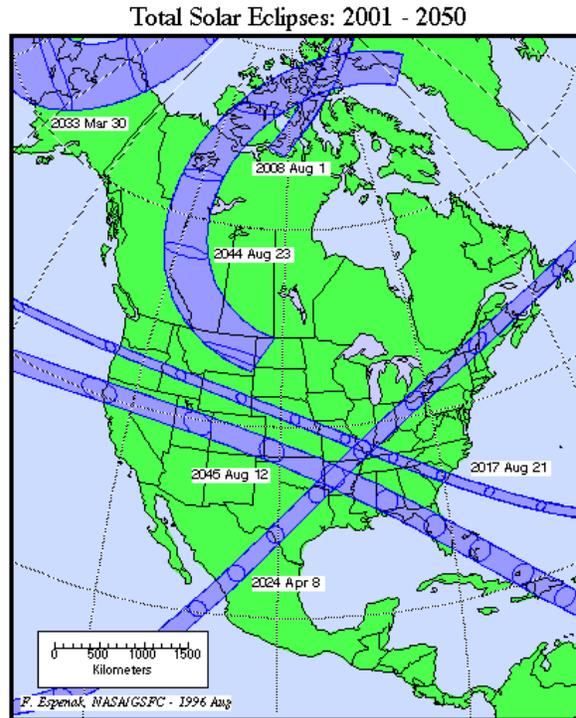
# ORION President's Perspective – Eclipse Developments

April 2017 - David Fields

Most people will never enjoy a Total Solar Eclipse unless they decide to travel a few hundred miles, find a good place to view, avoid the clouds, bring eye protection (eclipse-glasses, not just sun-glasses), sunscreen (yes) and hat, water and food, avoid crowds and insects. With no eye protection, one's eyes will be so damaged that when "totality" occurs... Not a nice thing to contemplate.

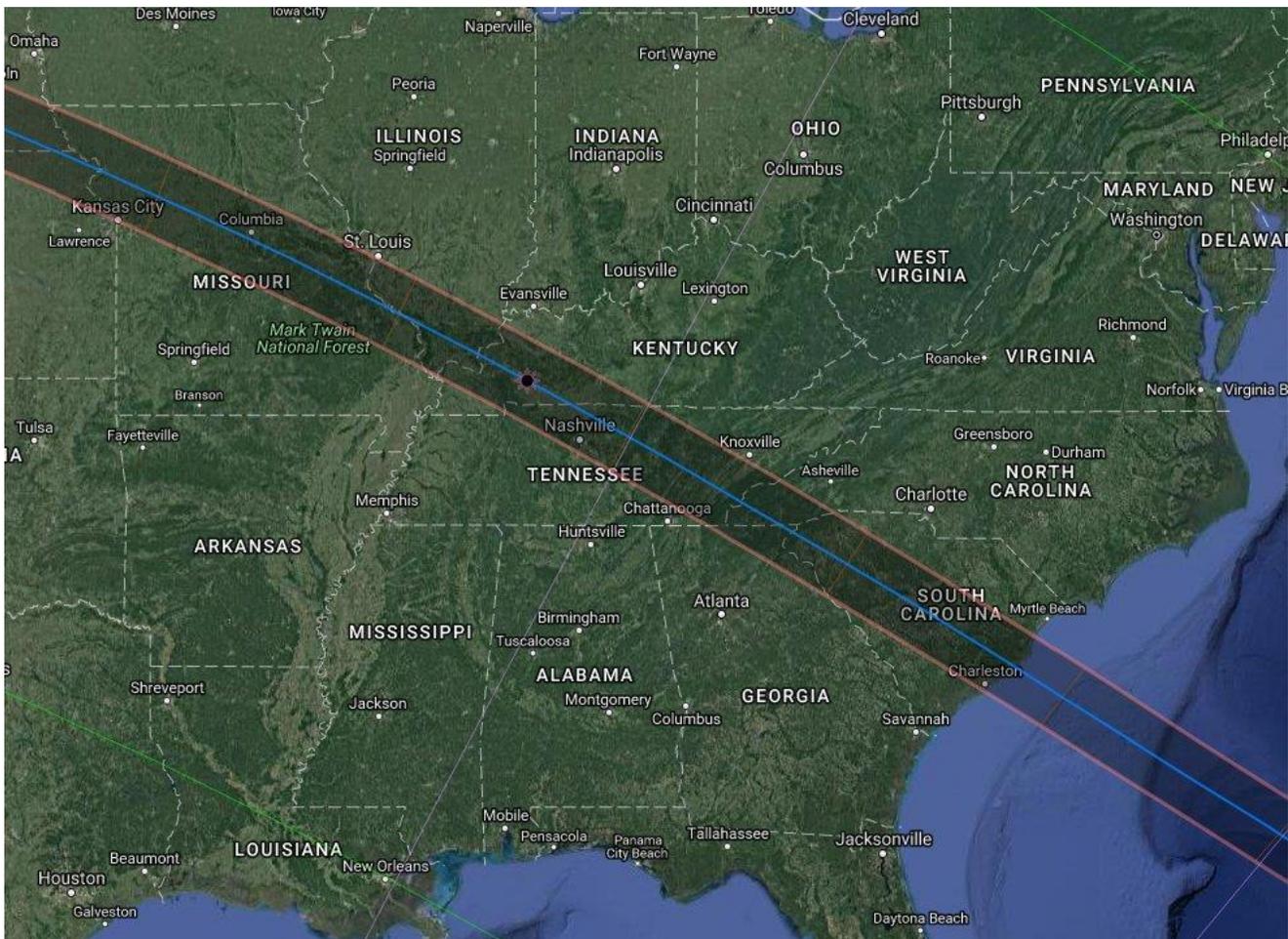
The profound rarity of total eclipses is suggested in the first figure, which shows total solar eclipses from 2001-2050. Eclipses are rare events, and most locations can claim a total solar eclipse only every few hundred years.

As said on [www.earthsky.org](http://www.earthsky.org), "If we only count total eclipses visible from the lower 48 states, we have 4 eclipses from 1951 to 2000, and 4 more from 2001 to 2050."



There are only 4 chances to view a total eclipse from the USA in the period spanning a half century. And that's not even considering the fact that cloudy weather will likely hide half of them from view! Rare events indeed! The Great American Eclipse of 2017 will be visible, clouds permitting, from a thin ribbon stretching from northern Oregon to South Carolina. From the edge of this ribbon, the duration of totality will be less than one second. From the center, it will be a bit over two minutes.

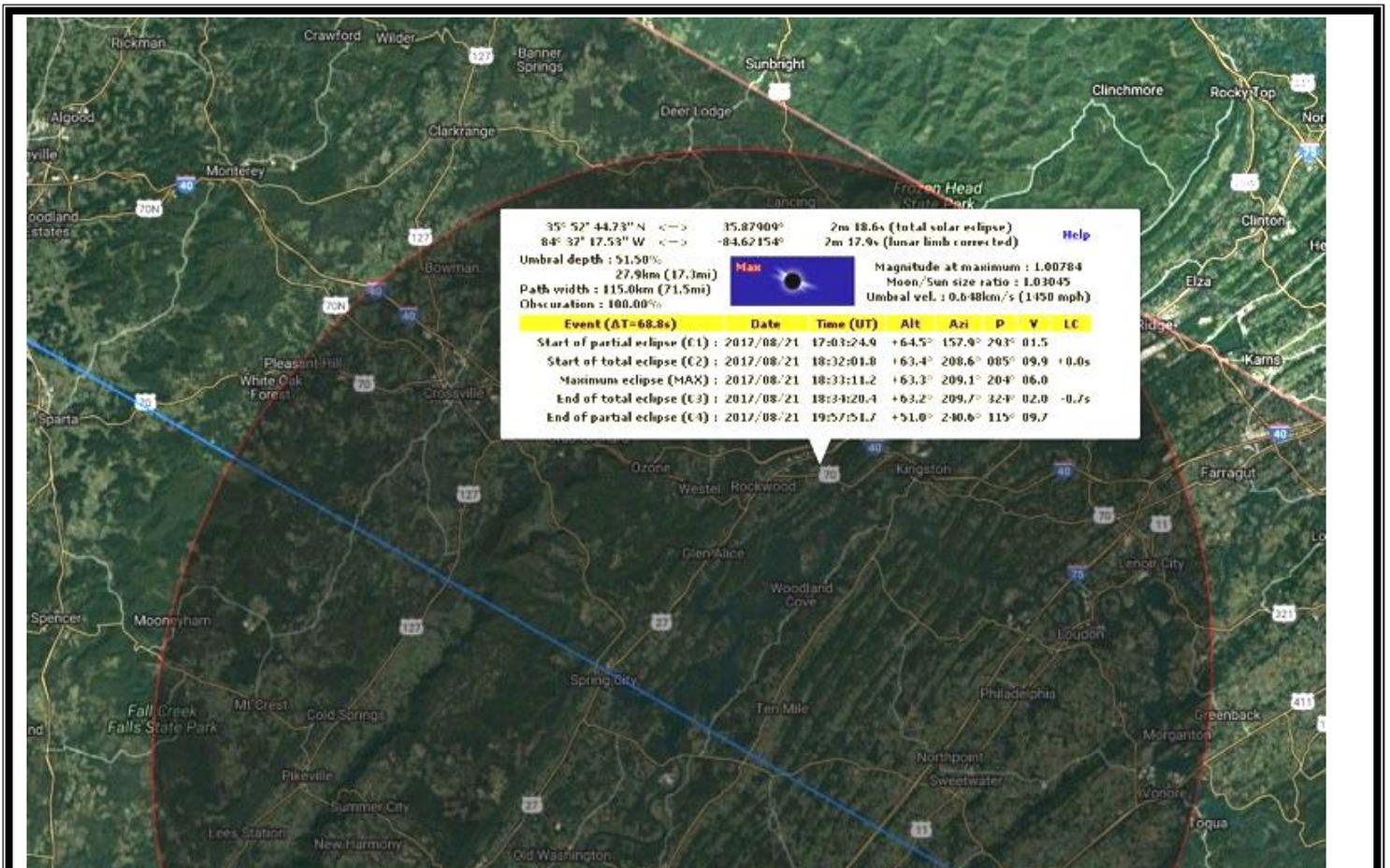
Locally, viewing may be possible from along Interstate 40, and as shown in the second figure (next page), from the communities of Harriman, Kingston, and Sweetwater. There are many other communities that will experience totality (including some parts of Oak Ridge), but in Oak Ridge, totality will be very brief. Most ORIONites know that Tamke-Allan Observatory will not be open, since the one-lane road cannot handle much traffic.



Sweetwater is notable because they are being promoted as the “place to be.” (Or the place NOT to be, if one doesn’t seek crowds). As of April 2017, Sweetwater is the announced viewing location that is supported by university lecturers, will have eclipse glasses, etc.

### Recent Developments

Fortunately for those of us wanting to plan ahead and share the experience and viewing aids of local astronomers, another possibility is developing, i.e., the Harriman Campus of Roane State Community College (RSCC). As noted on the figure on the next page, the duration of totality will be 2 minutes 18 seconds at this location.



Here's a tentative Eclipse Day schedule for the RSCC location:

Early Set-up for astronomers in south parking lot	11:00:00 AM
Meet in O'Brien Theater	
Eclipse/safety lecture (30-45m)	11:30:00 AM
Adjourn to parking lot	12:45:00 PM
Start of partial eclipse (C1) :	1:03:25 PM
Start of total eclipse (C2) :	2:32:02 PM
Maximum eclipse (MAX) :	2:33:11 PM
End of total eclipse (C3) :	2:34:20 PM
End of partial eclipse (C4) :	3:57:52 PM

For a pleasant experience one should bring one's own food, water, eclipse eye protection (not just sun glasses), sunscreen and hat.

## TAO Events

### Public Stargaze April 1

Well there certainly was no fooling around this April Fool's Day! The skies were clear, the food was good and there were numerous visitors. People are finding out about TAO from the internet, newspapers, and word of mouth. I believe there were about 20 attendees both adults and young ones.

Goodies included a large and tasty banana pudding from Chef Jim Long, a tray of brownies and a tray of blondies from Margaret, some good and somewhat healthy bread from David, and assorted chips, dips and clips!

The clear skies brought out additional telescopes and astronomers.



The 12 inch LX200 telescope was donated in 1998 and has been serving TAO students and visitors for some nineteen years! DR Fudge provided the POD dome. At TAO public nights, DR operates the LX200 or the 13.5 inch Dobsonian reflector affectionally known as **the Dragon**. When both of these large scopes are in use, Roy will operate the LX200.

Larry Robinson most often brings his 11-inch Celestron CPC Schmidt-Cassegrain telescope. The Celestron scopes are high quality with good optics and pointing accuracy. Larry always attracts a group of young astronomers as he tells facts and fiction about the objects in the telescope.

Owen Hoffman helped by showing deep sky objects to the TAO visitors using his 10" ORION Dobsonian telescope.



Owen Hoffman is setting up his telescope for the April 1 TAO Public Stargaze. Owen knows the night sky and can show visitors the constellations and their stars by name and with associated folk lore.

## Outreach and Education

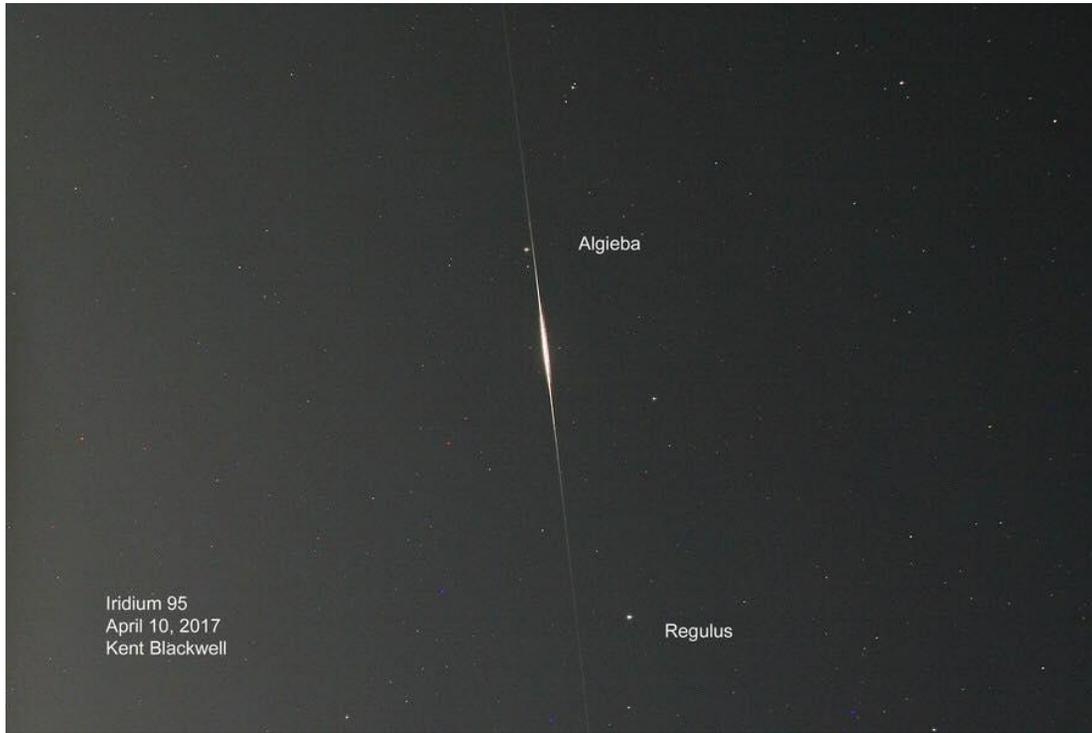
Our sister club, the Knoxville Observers, traveled to Camp Buck Toms near Crossville to show the skies to some 40 cub scouts. Roger Lane led this expedition with 5 club members and some SMAS members and their telescopes. The next event with some **400** campers will be on April 21. I am planning to help with this one and other ORION members should too!! For more info contact Roger at [bigfoot37918@bellsouth.net](mailto:bigfoot37918@bellsouth.net)

## Parting Shots

The Trapezium features an astroimage(s) from local astronomers in each issue. This month's image comes from Nathan Brandt a resident of Clinton and a member of the Knoxville Observers astronomy club.



This image of M81 or Bodes Galaxy was taken from Brandt's backyard observatory in Clinton using a 5 in. refractor on an Astro Physics mount. The exposure time was 8 hrs through LRGB filters. M81 has undergone a collision with its companion M82 the cigar galaxy. This image shows distortion of the galaxies' spiral arms, and in fact one of the arms has been ripped away and is very dimly seen in the lower right corner as a faint blue smudge. For more of Nathan's images including a great look at the Cigar (M82) go to Nathan's website at <http://celestial-imaging.com>



Kent Blackwell of Virginia Beach captured this Iridium flare as it passed through Leo. Kent was a frequent visitor to TAO and ORION meetings when he visited friends in Oak Ridge.

## 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

Publicist: Jennifer Hartwig

AV Coordinator: Bob Williams

Videographer: John Preston