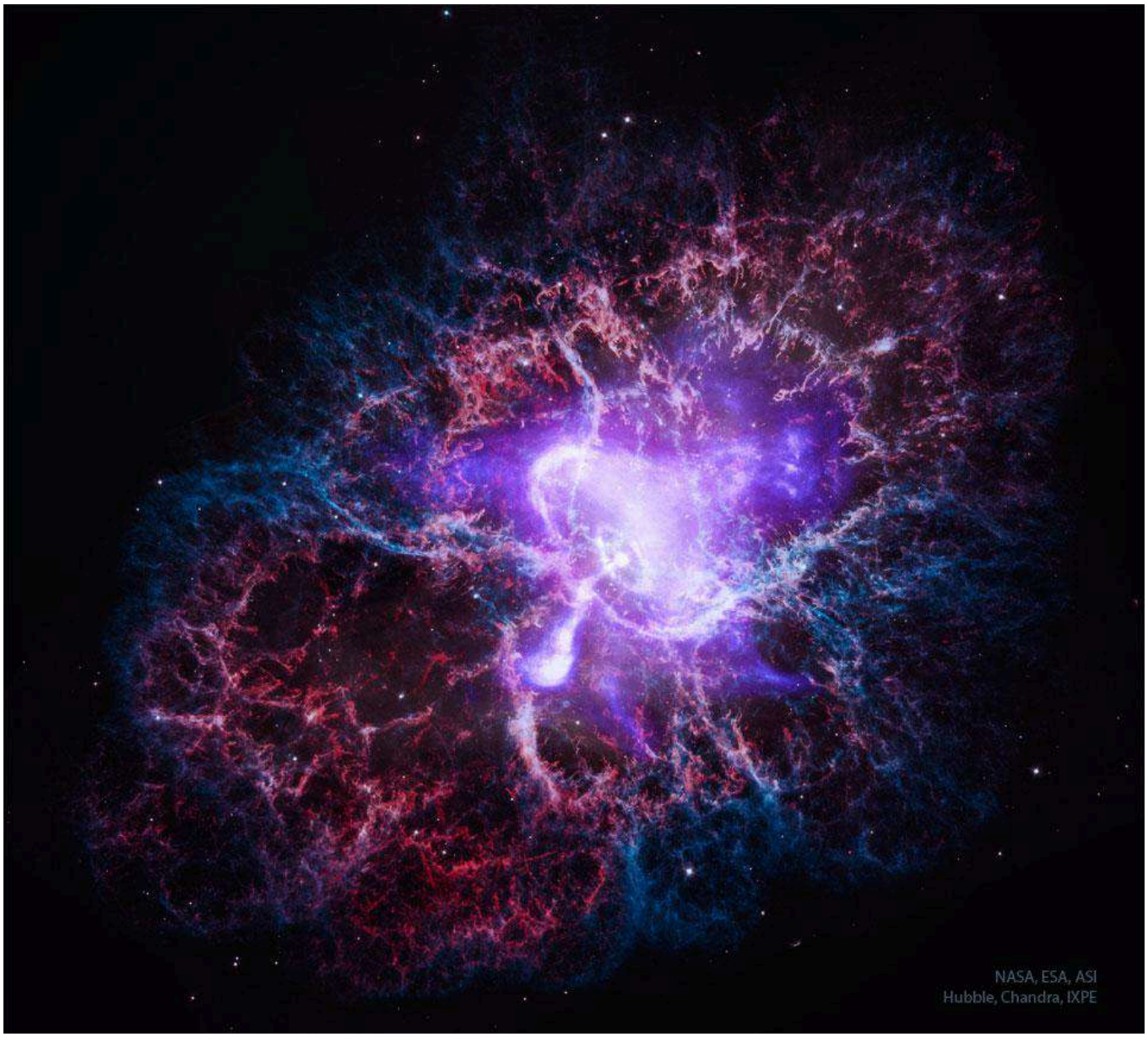
Keene Amateur Astronomers

The Newsletter for Keene Amateur Astronomers

Vol. 2024 No. 4 August 2024

Crab Nebula



The above is a recent Astronomy Picture of the Day. The picture combines, visible light depicted in red and blue from the Hubble Space Telescope, X-ray light from Chandra X-ray Observatory in white, and X-rays detected by Imaging X-ray Polarimetry Explorer in purple. Image Credit: NASA, ESA, ASI, Hubble, Chandra, IXPE

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Editor's Message

August provides a variety of opportunities to enjoy the night sky with and without a telescope. The sun is nearing its maximum and there still remains the possibility to see another aurora event. August always is a great time to view a meteor shower. If you haven't gone outside yet, you might still be able to catch the Delta Aquariid meteor shower the next few nights. The Perseids will peak on August 11th and 12th, and is one of my favorite meteor showers. I recommend finding a spot facing Northeast to see the Perseids but its best to have a clear sight of the entire sky because they can appear anywhere in the sky.

It's also a great month to view the Milky Way. If you have a clear view of the Southern sky, Sagittarius and Scorpio provide a number of great observing targets for both telescopes and binoculars as we look towards the center of our galaxy. The Lagoon Nebula appears just above the teapot of Sagittarius and is as wide as three full Moons making it a great nebula to observe with binoculars or a telescope.

In this newsletter you will find information on our next meeting, September's International Observe the Moon event, how to participate in two citizen science projects, free events hosted virtually by the Astronomical Society of the Pacific, retreats/conventions, optical transient astronomy and an app you can download, star maps, and our monthly NSN article focusing on Double Stars. I hope you find something of interest this month. As for myself, I look forward to using the mobile app ZARTH to explore transient events.

As you are out and about enjoying the night sky or participating in an astronomy retreat or convention, please take time to take a picture to share in our future newsletters.

- Susan Rolke

Monthly Business Meeting

Please see the Minutes for details regarding the July meeting.

The next meeting will be held on August 9th at the Observatory in Sullivan at 7 pm. Observing to follow the monthly meeting, weather permitting.

Upcoming KAA Events

Susan and Bob will be hosting a public training of how to use the library telescope at the Keene Public Library on August 15th at 6:30 pm. This past month Susan and Bob met with several members of the staff at KPL to train them on the telescope and created a quick start guide of how to set up and use the library telescope.

International Observe the Moon is September 14th at 6:30 at the trailhead to the Ashuelot Park in downtown Keene. We invite members of the club to come and bring your telescope(s) if you have one.

Astronomy Conventions & Retreats

Adirondack Astronomy Retreat in Lewis NY. Retreat #1 starts July 28th

Stellafane Convention 2024 in Springfield VT starting August 1st

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Things To Do

- Sonify the Cosmos
    - You may have heard astronomical data that has been sonified. Now you can turn the largest supernovae data set into your own symphony.
- Virtual Presentations hosted by the Astronomical Society of the Pacific (free)
    - NASA's Mission to Touch the Sun - Parker Solar Probe with Kelly Korreck, NASA Headquarters, August 22nd, time tbd
    - Small Town Universe - A Documentary portrays life in Greenbank Virginia, home to the world's most sensitive radio telescope and where wifi and cell phones are banned. August 23, time tbd
- Competition to Name a Quasi-Moon
    - The International Astronomical Union and WNYC's science podcast, Radiolab, invite you to participate in naming one of Earth's quasi-Moons. Submissions are open until September 30th. Interested individuals who submit a name are also asked to write a short description.

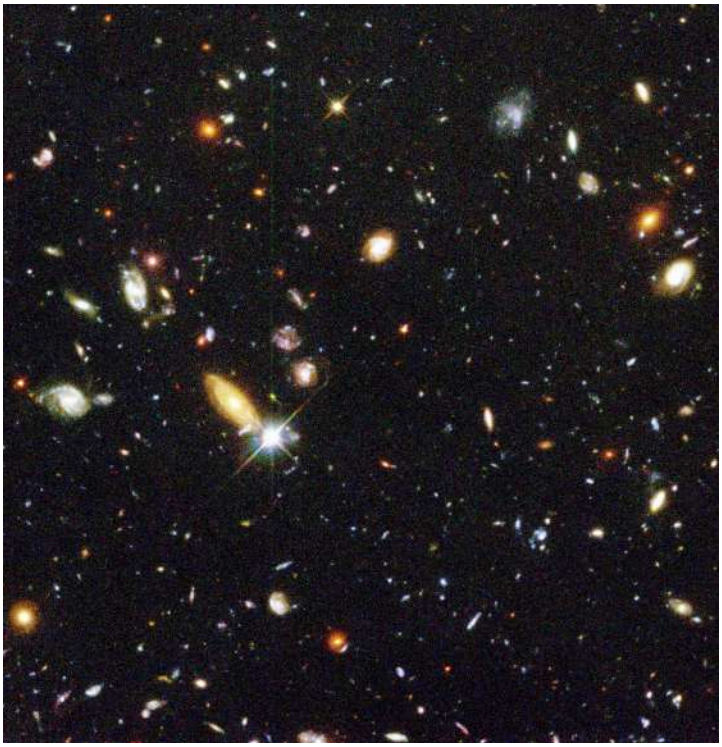
Transient Optical Astronomy

By Susan Rolke

This month's article was inspired by the plenary talk given by Jocelyn Bell Burnell titled ‘Bursts, bangs, and things that go bump in the night’ at the American Association of Physics Teachers (AAPT) national convention in Boston this past month. Jocelyn Bell Burnell discovered the first radio pulsars in 1967. Julie Farhm and I attended the convention and had the opportunity to hear her speak. I was unable to find a video of her presentation from AAPT but have found a similar one from several years ago and have included a link at the end of this article.

Optical transient astronomy focuses on the change in brightness of an object over a short period of time. It must be kept in mind that astronomers often talk in millions or billions of years so a short period of time could be anything from a fraction of a second to many days.

We are often lulled into a sense that our universe is calm and serene with changes happening over long periods of time. Images of deep space objects are the result of data collected over an extended time period. The most famous example of this is the Hubble Deep Field which was created from the accumulation of over 140 hours of data obtained by imaging an area smaller than a tennis ball as seen from 100 meters (328 ft) away.



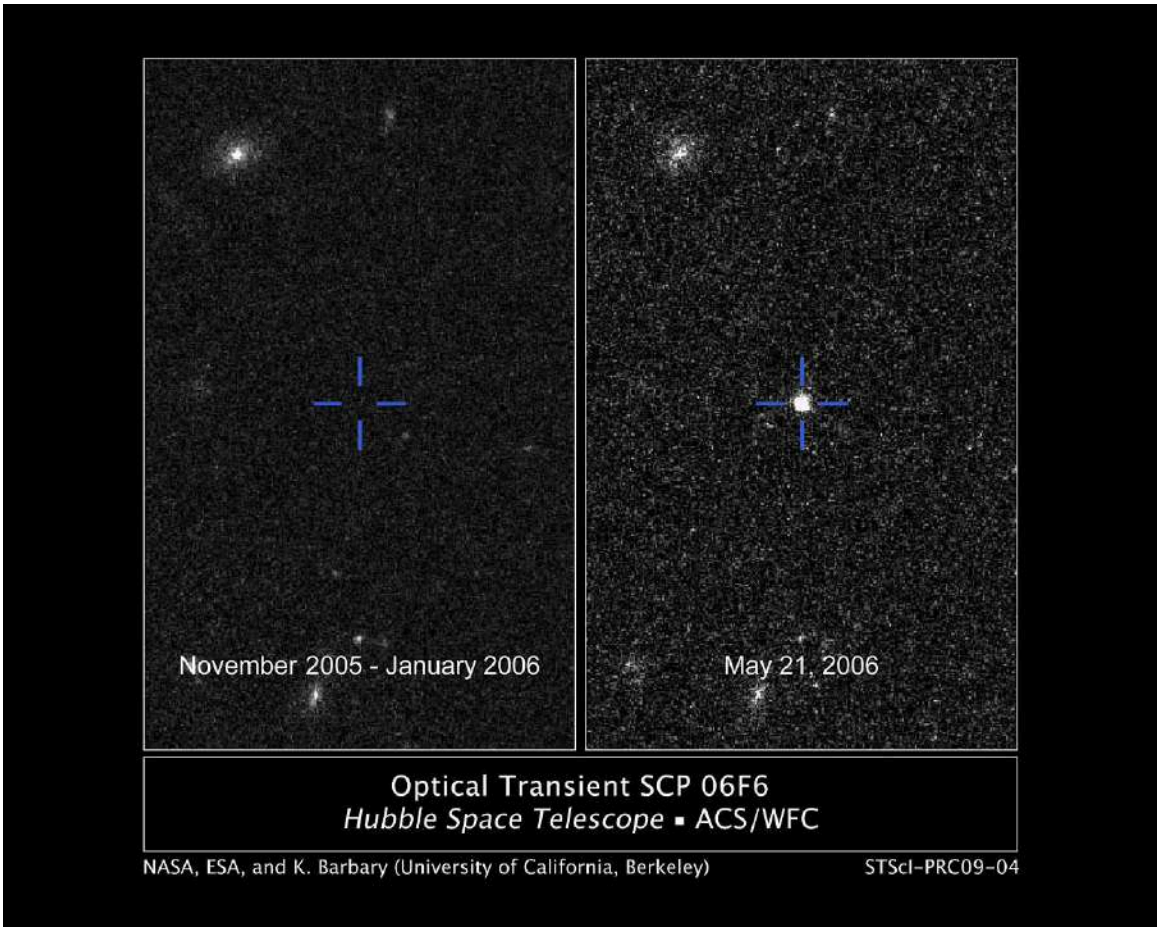
Hubble Deep Field was assembled from images taken in 1995. Credit: NASA, Robert Williams, and the Hubble Deep Field Team (STScI)

The image created is stunning and has led to a wealth of scientific knowledge. At the same time, it is an image of average of light intensity and motion. As a result, information is lost. Anything that happened on a short time scale or is in motion is not represented in this image. The shortcoming of this type of image might

best be understood by considering a traffic light. If a traffic light is imaged for an hour it appears as if all of the lights, red, yellow, and green, are on at the same time. In contrast, if images of the traffic light are taken at a short time interval, we see that only one light is on at a time and that there is a distinct pattern to the color of the lights as they change.

While astronomers studying pulsars, x-rays, and gamma rays have been studying transient events for decades, optical astronomers have only recently begun focusing on this area due to recent technological developments. Several observatories have been modified to conduct optical transient surveys of the night sky.

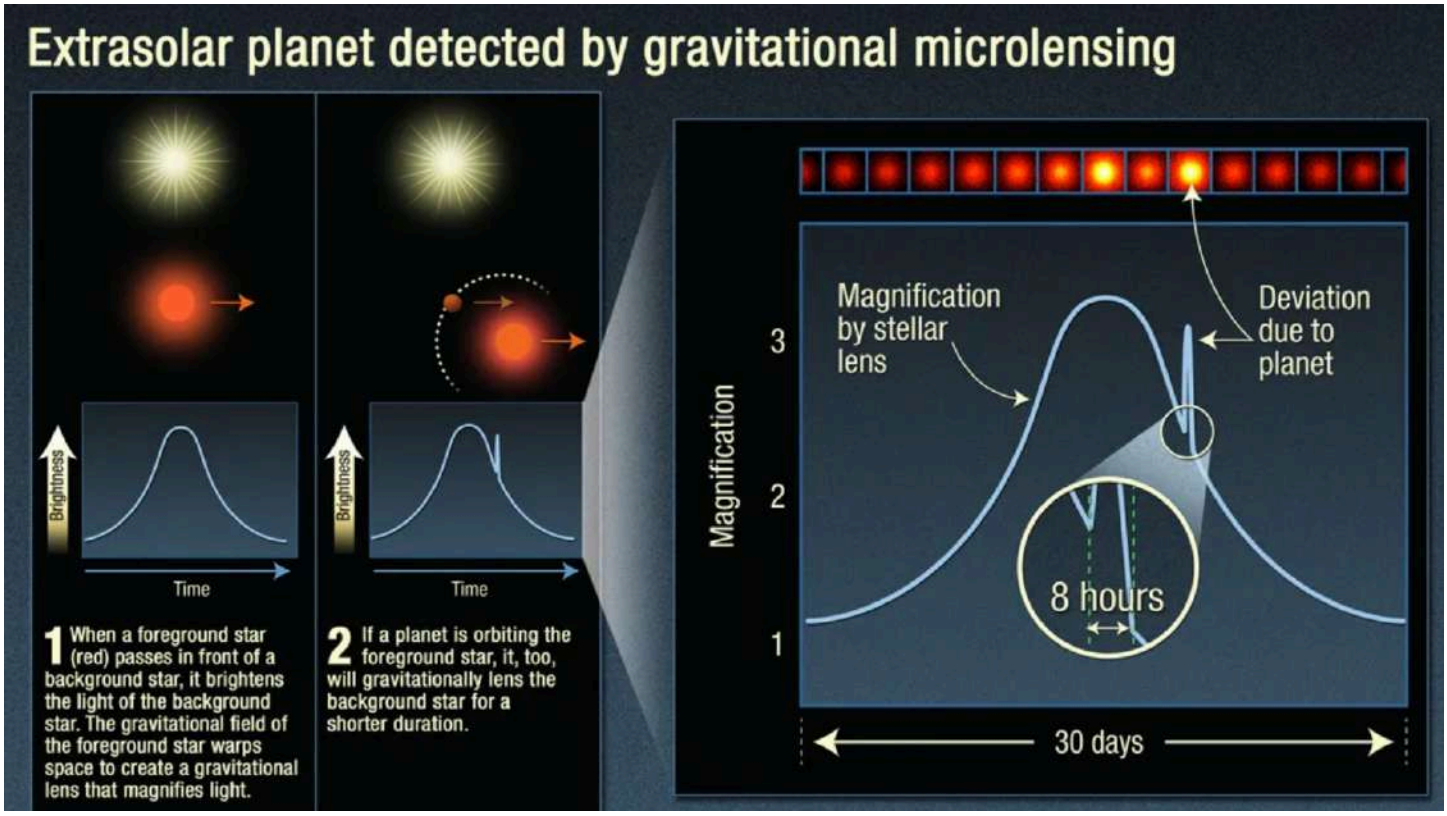
Traditionally, telescopes are trained on a distant object for an extended period of time. In contrast, a telescope performing a survey for transient objects might take a series of 30 second exposures of an image at ten minute intervals. The series of images are compared to each other as well as subsequent series of images under similar lighting conditions. Similar lighting provides the ability to quickly compare the images for differences and identify transient events.



The pair of images shows an object detected on February 21 in 2006 that brightened over 100 days and then dimmed for another 100. The cause of this phenomenon remains unknown. **Credit:** NASA, ESA and K. Barbary (University of California, Berkeley)

The image shown on the prior page is of a transient event captured by the Hubble Space Telescope. The object brightened over a period of 100 days and then proceeded to dim for 100 days. The phenomenon that caused this is still unknown. The object was found when searching for supernovae in distant galaxies but does not match the optical signature of the known types of supernovae or other identified transient astronomical phenomenon.

Some researchers are using surveys of optical transient events to find and track moving objects such as comets, asteroids, and orphaned planets. Through a technique called gravitational microlensing, astronomers are using the gravitational field around a star which naturally acts like a lens to study more distant objects. In this way, something that was previously invisible can be seen as the star between us and the object of interest, bringing the distant light into focus. Using microlensing, astronomers have detected the light signature of orphaned planets. Similar to how an orbiting planet will cause a spike in the light curve of a distant star imaged through the use of microlensing, spikes from orphaned planets are being found without a parent star. Extrapolating from current data, researchers predict there are more orphaned planets in the Milky Way than stars.



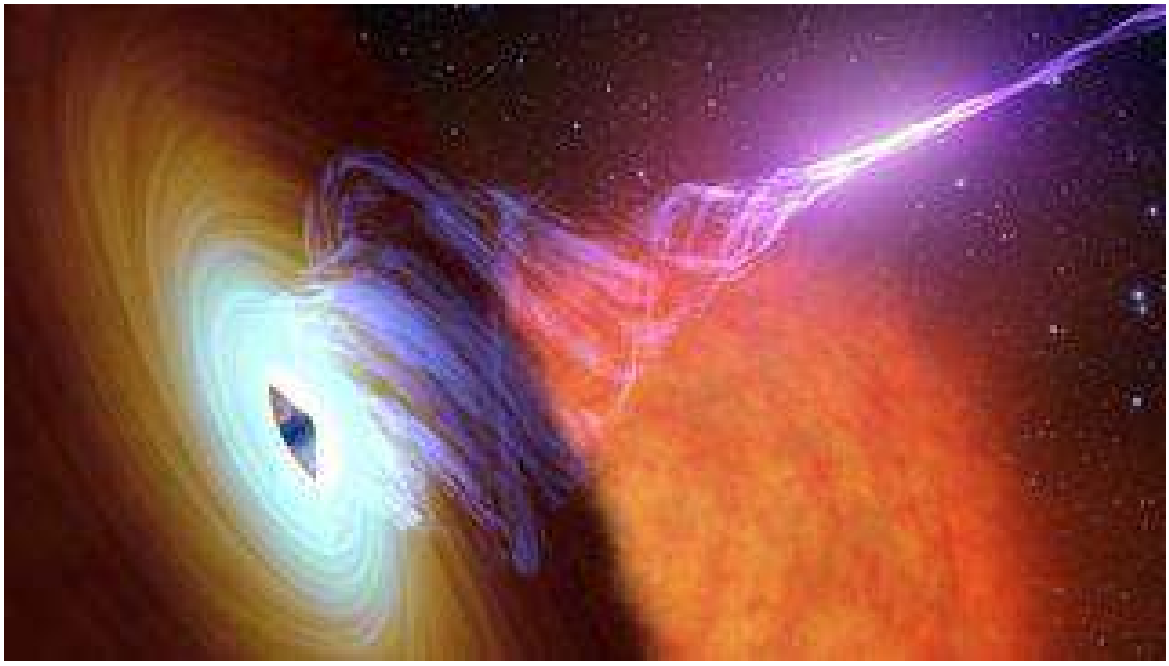
The image shows a light curve of a distant star and effect of an orbiting planet, seen as a spike. Credit NASA

I wanted to pause for a moment before going on. Many of us grew up and we had not detected any planets beyond our solar system. Now we have found thousands of planets orbiting distant stars and it is predicted that there are more orphan planets than stars. That is incredible.

We live in a violent universe. One filled with the cataclysmic end stages of massive stars, collision of neutron stars, interactions with black holes. Most of us equate black holes and pulsars with x-ray and gamma

ray astronomy but optical imaging is being added to our arsenal of tools to study the night sky. However, even more alluring to those of us with curious minds are the events that currently have no explanation. Transient astronomy is currently a field of firsts with events never seen before being observed.

A series of extremely bright and repetitive flares was first imaged by the Zwicky Transient Facility (ZTF). The flashes lasted for a minute and 14 transient events were captured over a period of 120 days. This first of its kind discovery was dubbed the “Tasmanian devil.” What made it unique was that each flash was as bright as the original explosion. More than a dozen telescopes participated in collecting data including the Low Resolution Imaging Spectrometer (LRIS) at the W.M. Keck Observatory in the visible wavelength and NASA’s Chandra X-ray Observatory that coordinated to take 5 images simultaneously in order to compare data. The exact process, perhaps a black hole feeding off a nearby star, that powered the flashes is still being investigated and remains an area of further research. To read more about this please see the links at the end of the article which includes the research paper published in Nature as well as information published on the ZTF website.



An illustration shows a dead star channeling a near-light speed jet blasted out by a black hole–could this be the cause of "the Tasmanian Devil?" (Image credit: NASA/JPL-Caltech (Caption))

The Zwicky Transient Factory (ZTF) at the Palomar Observatory in California is a robotic telescope. It completes a survey of the Northern sky every 2 days looking for transient events. Transient events are found using algorithms and the data is then provided to researchers. The survey collects a vast wealth of information on a regular basis. On average, it discovers a new supernova every day. To date, over 8,800 supernovae and over 231 near earth objects. It was the first optical telescope to image a tidal disruption event (TDE) which happens when a star passes too close to a black hole and is pulled into an elongated shape before being ‘devoured.’ Recently the ZTF captured direct evidence of the death of a massive star, type II supernovae, and the stellar remnant it formed, adding to our understanding of stellar evolution.

If you are interested in getting involved in transient astronomy or simply want to engage with it, astronomers at ZTF have created ways for you to be part of this exciting field of research. There are currently two citizen science projects you can participate in. Due to the vast amount of data, researchers need help to sort through the data to rule out false events in the Zwicky Quirky Transient citizen science project. Alternatively, you can help identify the type of supernova with the Zwicky Chemical Factory citizen science project.

There is also a mobile app they created, ZARTH, that can be downloaded to your phone. ZARTH, short for ZTF Augmented Reality Transient Hunter, provides you with the opportunity to explore our dynamic sky using real astronomical data. After downloading the app, you simply point your cellphone at an area of the sky to hunt for transient events discovered by the ZTF. It is designed as a game and allows you to collect points. What sets this game apart is that the transients that appear in the app are real cosmic events and you can learn about them. Information on the website indicates that future versions of the app will use your feedback to help researchers.

Resources and links:

Jocelyn Bell Burnell at IOP Physics presenting 'Bangs, burst and things that go bump in the night'

Astrobites Guide to Transient Astronomy

ZTF on the 'Tasmanian devil' research

Nature published paper on 'Tasmania devil'

ZTF Citizen Science projects

ZARTH mobile app

Night Sky Network Online Webinar

The Night Sky Network hosts monthly webinars for members to learn more about space and current research. If you are looking to watch a presentation you missed, you can view a recording at Night Sky Network's youtube channel.

Join the Night Sky Network as it hosts this month's program on Wednesday August 7, at 8:00 PM EST with information about the International Observe the Moon Night. The **Andrea Jones** and **Caela Barry** from NASA's Goddard Space Flight Center and **Theresa Summer** from the Astronomical Society of the Pacific will share information on how to host a successful event. This will include hands-on events, new Moon maps, and other shareables.

The event will be live streamed at **https://www.youtube.com/watch?v=ooogtKCjsRQ**

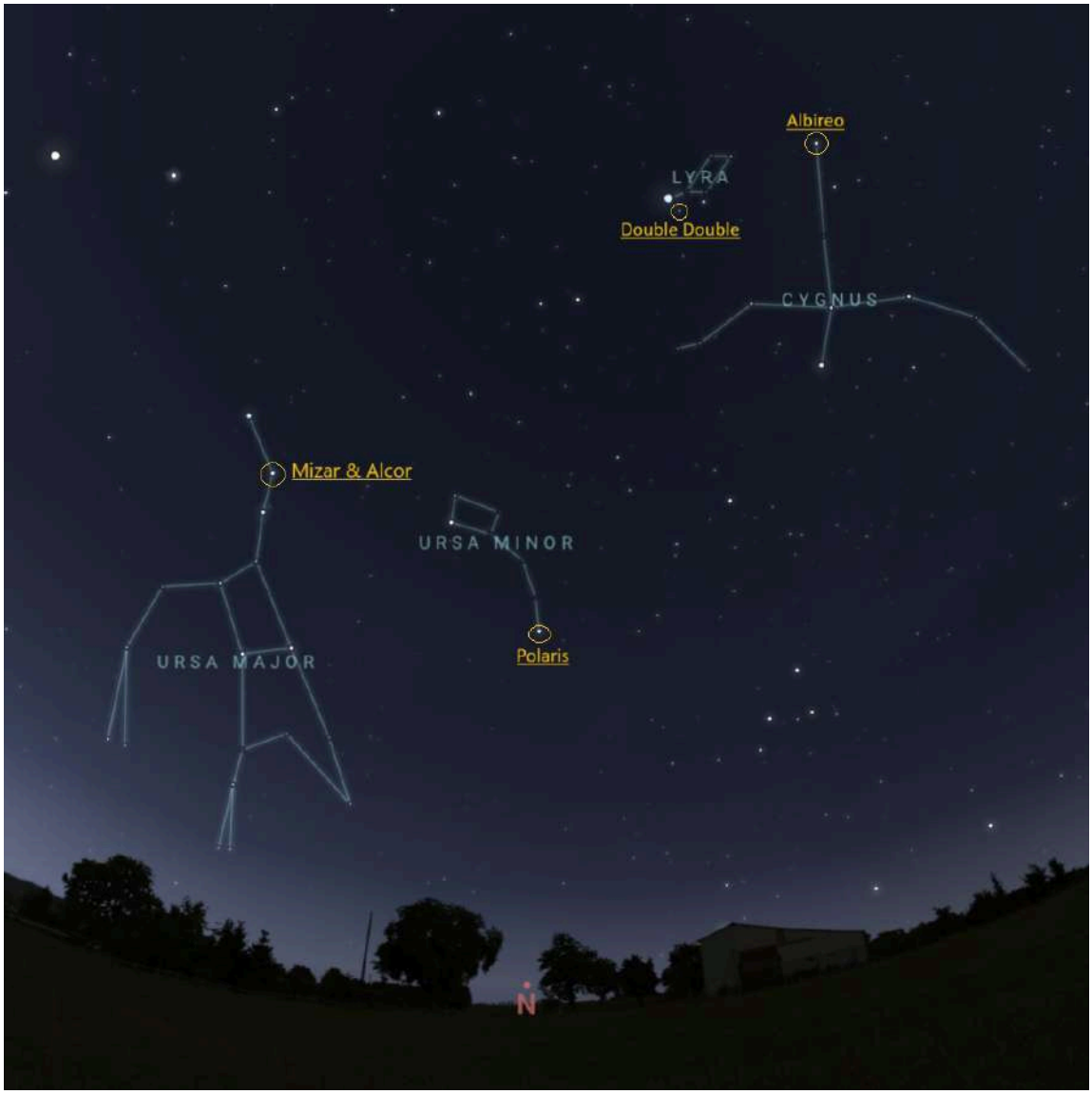
NASA Night Sky Notes, July 2024

This article is distributed by NASA's Night Sky Network (NSN).
The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

August Night Sky Notes: Seeing Double

By Kat Troche

During the summer months, we tend to miss the views of Saturn, Jupiter and other heavenly bodies. But it can be a great time to look for other items, like globular star clusters such as Messier 13, open star clusters such as the Coma Star Cluster (Melotte 111), but also double stars!



Mid-August night sky constellations with the following multiple star systems highlighted: the Double Double in Lyra, Albireo in Cygnus, Polaris in Ursa Minor, Mizar and Alcor in Ursa Major. Credit: Stellarium Web

What Are Double Stars?

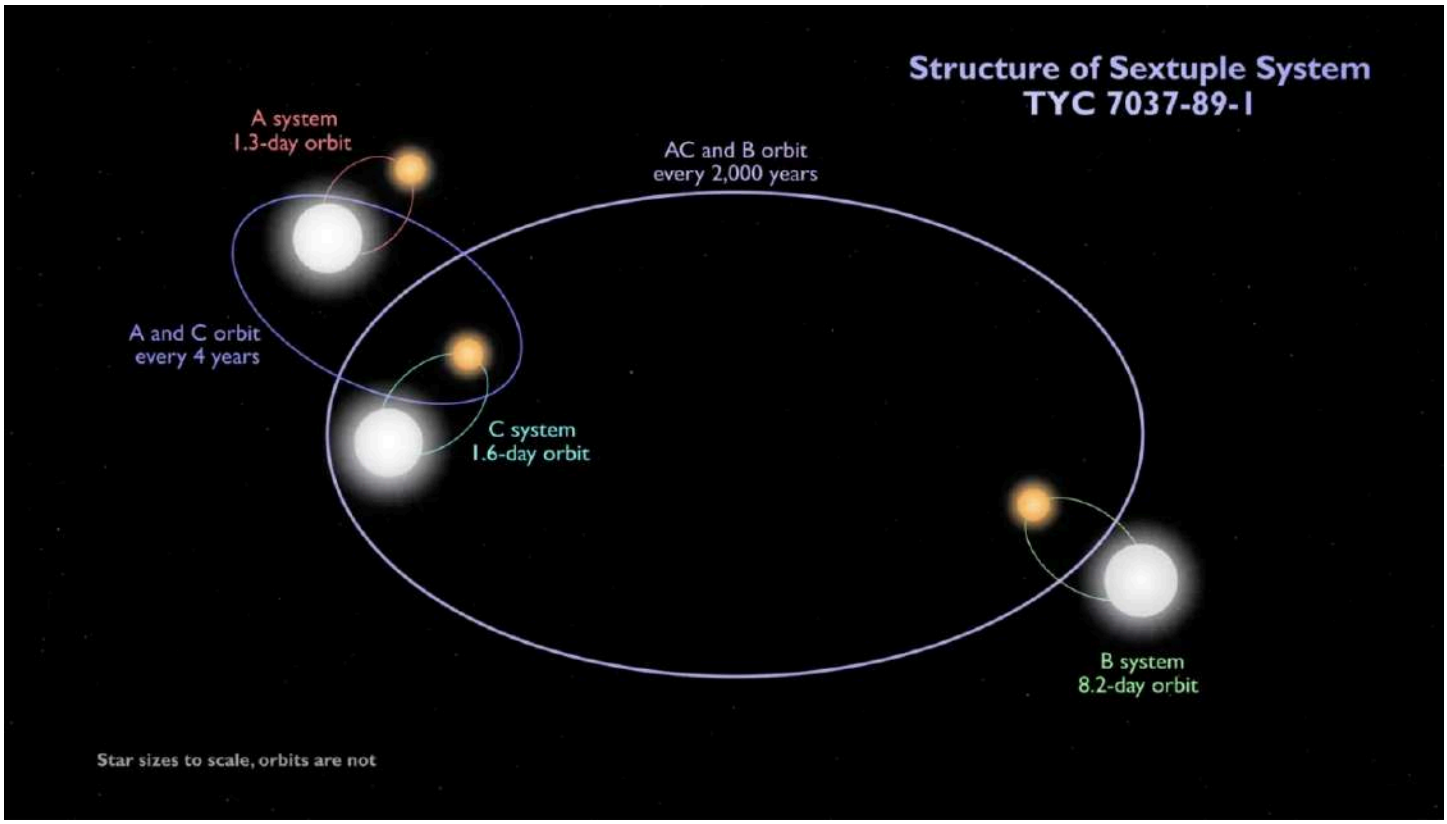
If you have seen any movies or read any books that refer to having two suns in the sky, that would be a *double star system*. These star systems typically come in two types – binary and optical doubles. Binary stars are two stars that are gravitationally bound and orbit each other, and optical double stars only *appear* to be close together when viewed from Earth, but in reality, are extremely far apart from another, and are not affected by each other's gravity. With a small telescope, in moderately light polluted skies, summer offers great views of these stellar groupings from the Northern Hemisphere:

Double Double: also known by its technical name, Epsilon Lyrae, this multiple star system appears as one star with naked eye observing. But with a small telescope, it can be split into 'two' stars. A large telescope reveals Epsilon Lyrae's secret – what looks like a single star is actually a *quadruple* star system!

Albireo: a gorgeous double star set – one blue, one yellow – in the constellation Cygnus.

Polaris: while technically a multiple star system, our North Star can easily be separated from one star to two with a modest telescope.

Mizar and Alcor: located in the handle of the Big Dipper, this pair can be seen with the naked eye.



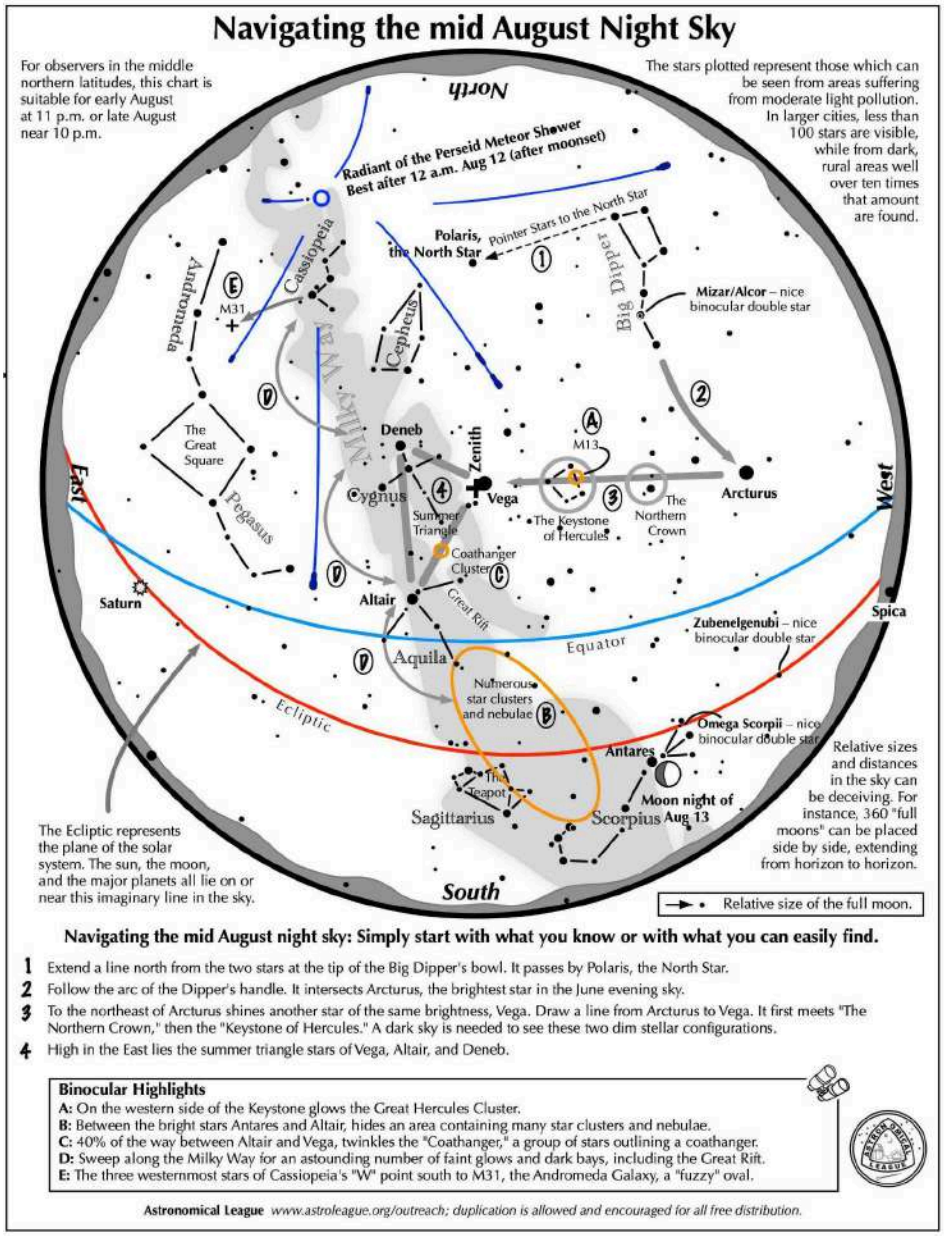
This schematic shows the configuration of the sextuple star system TYC 7037-89-1. The inner quadruple is composed of two binaries, A and C, which orbit each other every four years or so. An outer binary, B, orbits the quadruple roughly every 2,000 years. All three pairs are eclipsing binaries. The orbits shown are not to scale. Credit: NASA's Goddard Space Flight Center

Aside from looking incredible in a telescope or binoculars, double stars help astronomers learn about measuring the mass of stars, and about stellar evolution. Some stars orbit each other a little too closely, and things can become disastrous, but overall, these celestial bodies make for excellent targets and are simple crowd pleasers.

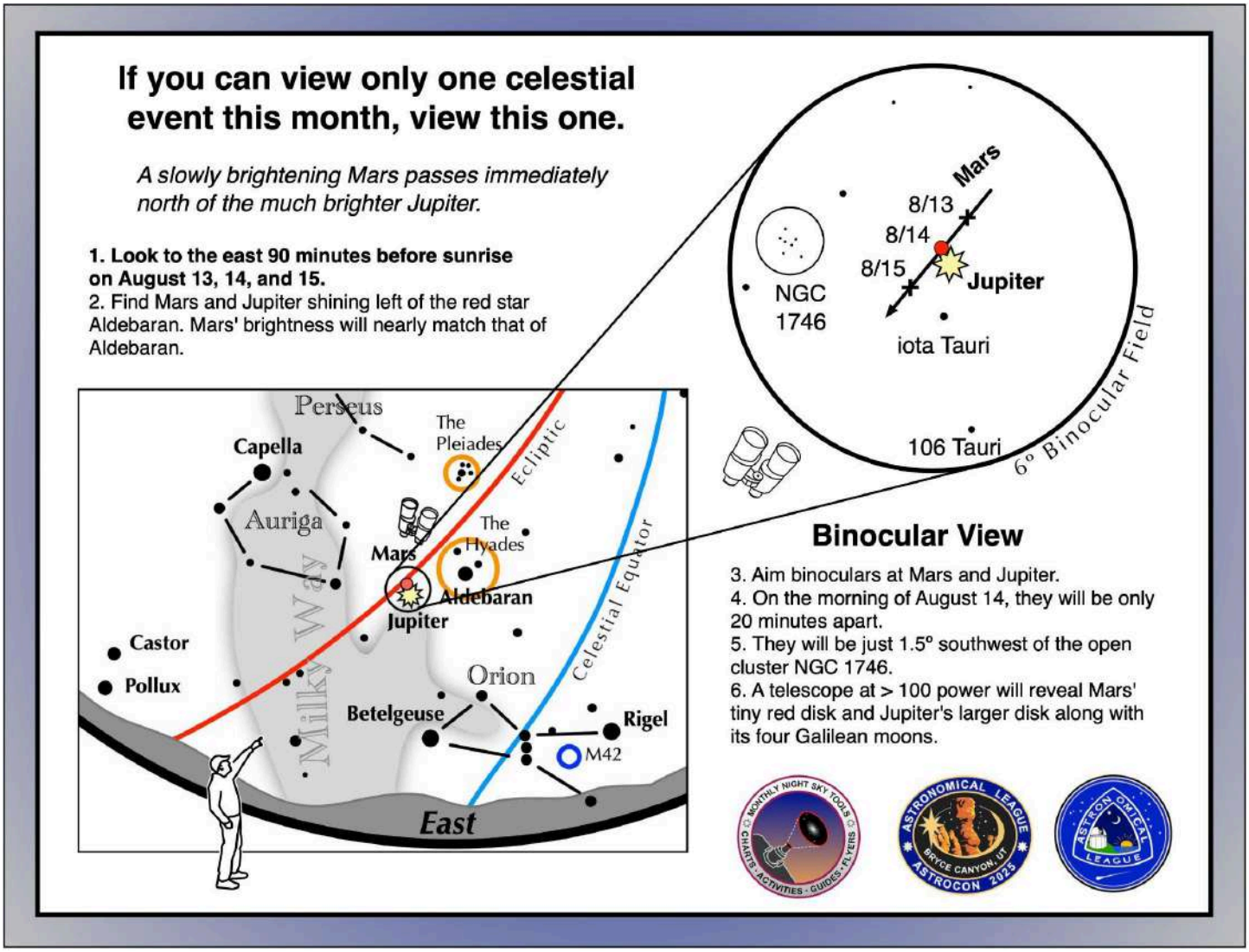
Observing

To find out skywatching tips for June, click on the following links (in blue and underlined) to learn more.

- Video: What's Up August 2024 Skywatching Tips from NASA



Click here for a larger image
August 2024



Click to see larger image: **Mar & Jupiter**