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CCAS member Frank Widmann shot this image of Markarian's Chain. Located in the constellation Virgo and visible during the Summer months, this string of galaxies forms part of the Virgo Cluster which contains over 1,300 galaxies.

Next Star Gazing: ONLINE!

Saturday, July 10th at 7pm PDT

CCAS President Aurora Lipper, and astronomers Kent Wallace and Brian Cox will be taking you on a virtual tour of the July night sky, so you can stargaze right from home!

Connect here: CentralCoastAstronomy.org/stargaze

Free Class: How to Use Binoculars for Astronomy On Demand!

Join Aurora and Brian as they go over what you need to know to get started touring the night sky with a pair of binoculars!

More info here: CentralCoastAstronomy.org/binoculars_6-22-21

Next Stargazing: ONLINE! Invite friends!! Saturday, July 10th at 7pm PDT

On July 10th, CCAS President Aurora Lipper, along with amateur astronomers Kent Wallace and Brian Cox will premier a tour of the July Summer sky. You'll learn about objects visible naked-eye, through binoculars, and through a telescope. Then, using the tools you learn during the video, you'll be able to stargaze from the comfort of your own home!



Invite all your friends! Anyone with the link can view our free online stargazing session. All that's needed is an internet connection. Join the stream using any tablet, personal computer, or YouTube enabled TV. After the premier, the video will be available on demand on our YouTube channel. Check our website for all the details:

CentralCoastAstronomy.org/stargaze

Summer Triangle Corner: Vega, Deneb & Altair by NASA Night Sky Network

nightsky.jpl.nasa.gov



Can you spot Vega, Deneb & Altair? You may need to look straight up to find them, especially if observing late in the evening in the Summer months.

Vega

If you live in the Northern Hemisphere and look up during Summer evenings, you'll see the brilliant star Vega shining overhead. Did you know that Vega is one of the most studied stars in our skies? As one of the brightest summer stars, Vega has fascinated astronomers for thousands of years.

Vega is the brightest star in the small Greek constellation of Lyra, the harp. It's also one of the three points of the large "Summer Triangle" asterism, making Vega one of the easiest stars to find for novice stargazers. Ancient humans from 14,000 years ago likely knew Vega for another reason: it was the Earth's northern pole star! Compare Vega's current position with that of the current north star, Polaris, and you can see how much the direction of Earth's axis changes over thousands of years. This slow movement of axial rotation is called precession, and in 12,000 years Vega will return to the northern pole star position.

Bright Vega has been observed closely since the beginning of modern

astronomy and even helped to set the standard for the current magnitude scale used to categorize the brightness of stars. Polaris and Vega have something else in common, besides being once and future pole stars: their brightness varies over time, making them variable stars. Variable stars' light can change for many different reasons. Dust, smaller stars, or even planets may block the light we see from the star. Or the star itself might be unstable with active sunspots, expansions, or eruptions changing its brightness. Most stars are so far away that we only record the change in light, and can't see their surface.

NASA's TESS satellite has ultra-sensitive light sensors primed to look for the tiny dimming of starlight caused by transits of extrasolar planets. Their sensitivity also allowed TESS to observe much smaller pulsations in a certain type of variable star's light than previously observed. These observations of Delta Scuti variable stars will help astronomers model their complex interiors and make sense of their distinct, seemingly chaotic, pulsations. This is a major contribution towards the field of astroseismology: the study of stellar interiors via observations of how sound waves "sing" as they travel through stars. The findings may help settle the debate over what kind of variable star Vega is. Find more details on this research, including a sonification demo that lets you "hear" the heartbeat of one of these stars, at: bit.ly/DeltaScutiTESS

Interested in learning more about variable stars? Want to observe their changing brightness? Check out the website for the American Association of Variable Star Observers (AAVSO) at <u>aavso.org</u>. You can also find the latest news about Vega and other fascinating stars at <u>nasa.gov</u>.

Deneb

The Summer Triangle is high in the sky after sunset this month for observers in the Northern Hemisphere, its component stars seemingly brighter than before, as they have risen out of the thick, murky air low on the horizon and into the crisper skies overhead. Deneb, while still bright when lower in the sky, now positively sparkles overhead as night begins. What makes Deneb special, in addition to being one of the three points of the Summer Triangle? Its brilliance has stirred the imaginations of people for thousands of years!

Deneb is the brightest star in Cygnus the Swan and is positioned next to a striking region of the Milky Way, almost as a guidepost. The ancient Chinese tale of the Cowherd (Niulang) and the Weaver Girl (Zhinü) - represented by the stars Altair and Vega - also features Deneb. In this tale the two lovers are cast apart to either side of the Milky Way, but once a year a magical bridge made of helpful magpies – marked by Deneb – allows the lovers to meet. Deneb has inspired many tales since and is a staple setting of many science fiction stories, including several notable episodes of Star Trek.

Astronomers have learned quite a bit about this star in recent years, though much is still not fully understood - in part because of its intense brightness. The distance to Deneb from our Sun was measured by the ESA's Hipparcos mission and estimated to be about 2,600 light years. Later analysis of the same data suggested Deneb may be much closer: about 1,500 light years away. However, the follow-up mission to Hipparcos, Gaia, is unable to make distance measurements to this star! Deneb, along with a handful of other especially brilliant stars, is too bright to be accurately measured by the satellite's ultra-sensitive instruments.

Deneb is unusually vivid, especially given its distance. Generally, most of the brightest stars seen from Earth are within a few dozen to a few hundred light years away, but Deneb stands out by being thousands of light years distant! In fact, Deneb ranks among the top twenty brightest night time stars (at #19) and is easily the most distant star in that list. Its luminosity is fantastic but uncertain, since its exact distance is also unclear. What is known about Deneb is that it's a blue-white supergiant star that is furiously fusing its massive stocks of thermonuclear fuel and producing enough energy to make this star somewhere between 50,000 and 190,000 times brighter than our Sun if they were viewed at the same distance! The party won't last much longer; in a few million years, Deneb will exhaust its fuel and end its stellar life in a massive supernova, but the

exact details of how this will occur, as with other vital details about this star, remain unclear.

Altair

Altair is the final stop on our trip around the Summer Triangle! The last star in the asterism to rise for Northern Hemisphere observers before summer begins, brilliant Altair is high overhead at sunset at the end of the season in September. Altair might be the most unusual of the three stars of the Triangle, due to its great speed: this star spins so rapidly that it appears "squished."

A very bright star, Altair has its own notable place in the mythologies of cultures around the world. As discussed in our previous edition. Altair represents the cowherd Niulang in the ancient Chinese tale of the "Cowherd and the Weaver Girl." Altair is the brightest star in the constellation of Aquila the Eagle; while described as part of an eagle by ancient peoples around the Mediterranean, it was also seen as part of an eagle by the Koori people in Australia! They saw the star itself as representing a wedge-tailed eagle, and two nearby stars as his wives, a pair of black swans. More recently one of the first home computers was named after the star: the Altair 8800.

Altair's rapid spinning was first detected in the 1960s. The close observations that followed tested the limits of technology available to astronomers, eventually resulting in direct images of the star's shape and surface by using a technique called interferometry, which combines the light from two or more instruments to produce a single image. Predictions about how the surface of a rapidly spinning massive star would appear held true to the observations; models predicted a squashed, almost "pumpkin-like" shape instead of a round sphere, along with a dimming effect along the widened equator, and the observations confirmed this!

This equatorial dimming is due to a phenomenon called gravity darkening. Altair is wider at the equator than it is at the poles due to centrifugal force, resulting in the star's mass bulging outwards at the equator. This results in the denser poles of the star being hotter and brighter, and the less dense equator being cooler and therefore dimmer. This doesn't mean that the equator of Altair or other rapidly spinning stars are actually dark, but rather that the equator is dark in comparison to the poles; this is similar in a sense to sunspots. If you were to observe a sunspot on its own, it would appear blindingly bright, but it is cooler than the surrounding plasma in the Sun and so appears dark in contrast.

You can take a Trip Around the Summer Triangle with this activity from the Night Sky Network. Mark some of the sights in and around the Summer Triangle at: <u>bit.ly/TriangleTrip</u>.

Additional Skywatching Resources

Plan your skywatching with help from the Night Sky News <u>planner page</u>, featuring daily stargazing tips courtesy EarthSky, monthly sky maps, and videos from NASA/JPL. You can even find out how to spot the International Space Station!

CCAS Contacts

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CCAS Information

Founded in 1979, the Central Coast Astronomical Society (CCAS) is an association of people who share a common interest in astronomy and related sciences.

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CCAS member Phil Klein took this image of the Trifid nebula (M20, left) and Lagoon Nebula (M8, right). Just above the Southwestern horizon on Summer evenings, lies the famed Teapot asterism of Sagittarius, where you'll find these nebulae.