

ASTRAL PROJECTIONS

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Cover Photo

IC 405: The Flaming Star Nebula. Rippling dust and gas lanes give the Flaming Star Nebula its name. The orange and purple colors of the nebula are present in different regions and are created by different processes. The bright star AE Aurigae, visible toward the image left, is so hot it is blue, emitting light so energetic it knocks electrons away from surrounding gas. When a proton recaptures an electron, red light is frequently emitted (depicted here in orange). The purple region's color is a mix of this red light and blue light emitted by AE Aurigae but reflected to us by surrounding dust. The two regions are referred to as emission nebula and reflection nebula, respectively. Pictured here in the Hubble color palette, the Flaming Star Nebula, officially known as IC 405, lies about 1500 light years distant, spans about 5 light years, and is visible with a small telescope toward the constellation of the Charioteer (Auriga). Image credit: Eric Coles and Mel Helm.

EVENT CALENDAR

January 10th - Monthly Meeting

Location: Ocean County College, Novins Planetarium, Building #13

Following club business, Phil Zollner will talk about his recent trip to the Lowell Observatory and will share visiting information and photos.

Time: 7:00 p.m. - 10:00 p.m.

Club Dues Are Due!

As of 2019, member dues have been reduced to \$15 for current members. New members, and current members who aren't paid by by March 31st, will pay \$20 for dues.

EVENT CANCELLATIONS

Members will receive an email notification of an event cancellation, or call the ASTRA Hotline: 609-971-3331

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December Meeting Recap

by Jim Webster

The meeting started off with some light talk about family holiday traditions. Moved into review and thanks for those that have participated with star parties and events for 2019. Highlighted Ro Spedaliere supporting ASTRA as Treasurer for 20 years, John Endreson for President, Chris Savia as Vice President-Secretary and newsletter editor, followed by Donald Durett as webmaster. Also, Geoffrey and Jackie for refreshments for club meetings, and Rich Brady for office & supplies.

Moved onto the 2020 Elections for President, Vice President-Secretary, and Treasurer.

Running:

President: John Endreson

Vice President-Secretary: Jim Webster

Treasurer: Ro Spedaliere

Image credit: Jim Webster



Each seat was running uncontested. Chris Savia will remain newsletter editor. A final show of hands agreed to 2020 selections.

Based on the uncontested running of the elections it was voted on all present, on a bylaw amendment that if a seat was unopposed that election for that seat was not needed. We next moved onto the 2019 awards presented by John Endreson. Those awarded are listed at the end of the meeting summary. Starting in 2020 Jim Webster will take attendance for star party participation.

Ro Spedaliere presented her year in review along with humorous awards, while listing the end of the meeting summary.

The meeting concluded with Phil Zollner presenting his slide show of the Mercury Transit and ASTRA membership at Jakes Branch.

The following members received NSN "certificates only" for participating in at least 3 ASTRA outreach events:

Carol Czitrom
Nathan Stroud
Kathleen Vandermark
Kieran Watt
Christine Murdza
John Deriso
Ron Bernknopf

The following members received NSN certificates and pins for participating in 5 or more ASTRA outreach events:

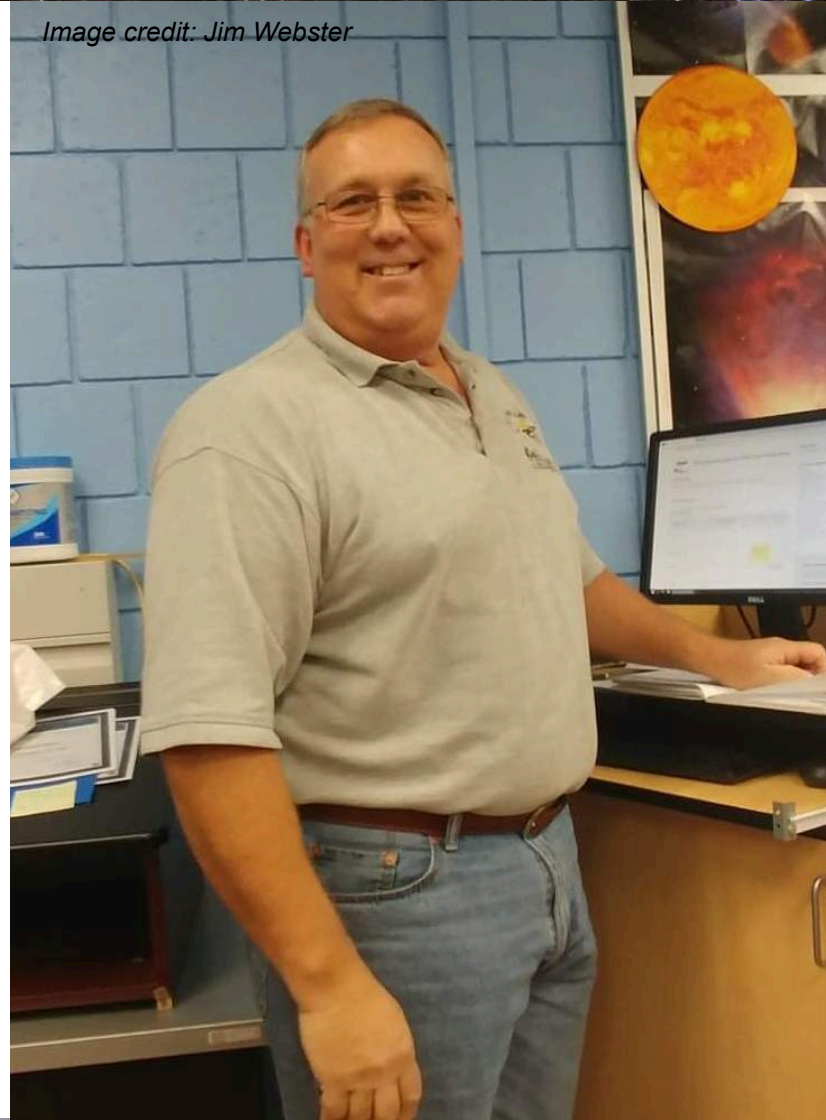
SUBMISSIONS WELCOME

Members are invited to submit articles, photos, news, or stories for inclusion with Astral Projections. Please contact Chris Savia at newsletter@astra-nj.org.

TRANSIT

John Endreson
Chris Savia
Rosemarie Spedaliere
Donald Durett
Jim + Gloria Webster
Vic Palmieri
Matthew McCue
Matt Crawford
Kevin Eak
Sam Granovsky
Ray + Kathleen Kozakiewicz
Ed Mullen
Gary + Suzie Moshier

Image credit: Jim Webster



Humor Awards:

Jim Webster: The Hydration Award
Gloria Webster: The Novice Award
Sam Granovsky: The Tangled Wire Award
Kevin Eak: The Have Dob Will Travel Award
Matthew McCue: The Gorton Fisherman Award
Matthew Crawford: The Ingenuity Award
Vic Palmieri: The Moon Man Award
Richard Brady: The Merry Mailman Award
John Endreson: The Telescope Repairman Award



Image credit: Jim Webster

Spot the Young Stars of the Hyades and Pleiades

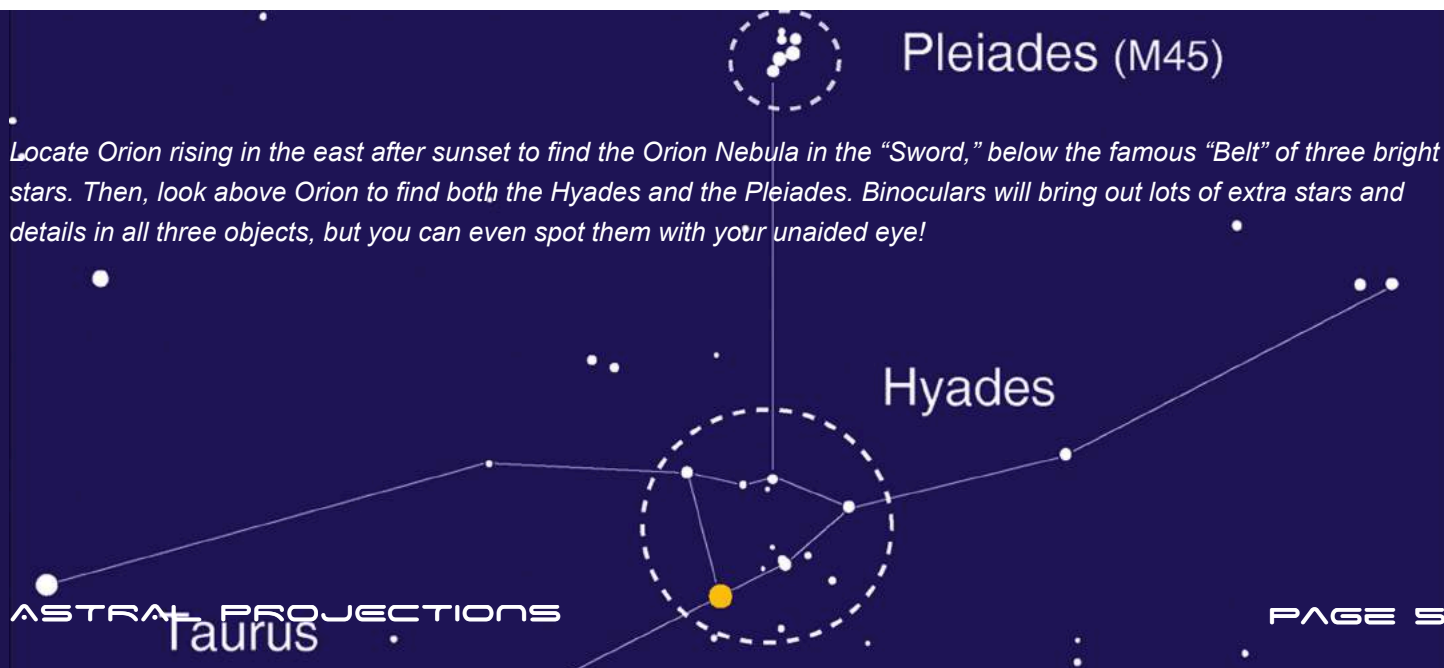
by David Prosper

Orion is the last of a trio of striking star patterns to rise during the late fall and early winter months, preceded by the diminutive Pleiades and larger Hyades in Taurus. All three are easily spotted rising in the east in early January evenings, and are textbook examples of stars in different stages of development.

As discussed in last month's Notes, the famous Orion Nebula (M42), found in Orion's "Sword," is a celestial nursery full of newly-born "baby stars" and still-incubating "protostars," surrounded by the gas from which they were born. Next to Orion we find the Hyades, in Taurus, with their distinctive "V" shape. The Hyades are young but mature stars, hundreds of millions of years old and widely dispersed. Imagine them as "young adult" stars venturing out from their hometown into their new galactic apartments. Bright orange Aldebaran stands out in this group, but is not actually a member; it just happens to be in between us and the Hyades. Traveling from Orion to the Hyades we then find the small, almost dipper-shaped Pleiades star cluster (M45). These are "teenage stars," younger than the Hyades, but older than the newborn stars of the Orion Nebula. These bright young stars are still relatively close together, but have dispersed their birth cocoon of stellar gas, like teenagers venturing around the neighborhood with friends

and wearing their own clothes, but still remaining close to home - for now. Astronomers have studied this trio in great detail in order to learn more about stellar evolution.

Figuring the exact distance of the Pleiades from Earth is an interesting problem in astrometry, the study of the exact positions of stars in space. Knowing their exact distance away is a necessary step in determining many other facts about the Pleiades. The European Space Agency's Hipparcos satellite determined their distance to about 392 light years away, around 43 light years closer than previous estimates. However, subsequent measurements by NASA's Hubble Space Telescope indicated a distance of 440 light years, much closer to pre-Hipparcos estimates. Then, using a powerful technique called Very Long Baseline Interferometry (VLBI), which combines the power of radio telescopes from around the world, the distance of the Pleiades was calculated to 443 light years. The ESA's Gaia satellite, a successor to Hipparcos, recently released its first two sets of data, which among other findings show the distance close to the values found by Hubble and VLBI, possibly settling the long-running "Pleiades Controversy" and helping firm up the foundation for follow-up studies about the nature of the stars of the Pleiades.



NASA, ESA, AURA/Caltech



Close-up of the Pleiades, with the field of view of Hubble's Fine Guidance Sensors overlaid in the top left, which helped refine the distance to the cluster. The circumference of the field of view of these sensors is roughly the size of the full Moon. (Image credit: NASA, ESA and AURA/Caltech)

STScI-PRC04-200

BETELGEUSE

Betelgeuse, Betelgeuse, Betelgeuse!

by Chris Savia

Way back in 2016, astronomers published some curious data concerning the red star Betelgeuse. First off, the red supergiant with a radius approximately similar to that of Jupiter's orbit possibly swallowed a companion star over 100,000 years ago. The University of Texas at Austin's very own J. Craig Wheeler raised this prospect when he discovered Betelgeuse was spinning faster than expected. How fast? 150 times faster than any star just rotating on its axis and fusing elements to generate energy. As Dr. Wheeler told *Phys.Org* back in 2016, "Suppose Betelgeuse had a companion when it was first born? And let's just suppose it is orbiting around Betelgeuse at an orbit about the size that Betelgeuse is now. And then Betelgeuse turns into a red supergiant and absorbs it—swallows it." Once swallowed, the companion's orbital angular momentum would be transferred to Betelgeuse's outer envelope thereby increasing its rotation. As to the putative companion's specifics, Wheeler guesses it was about the same mass as our sun to account for Betelgeuse's current spin rate of 15km/second. That's quite fast for a star 1,000 times wider than our sun.

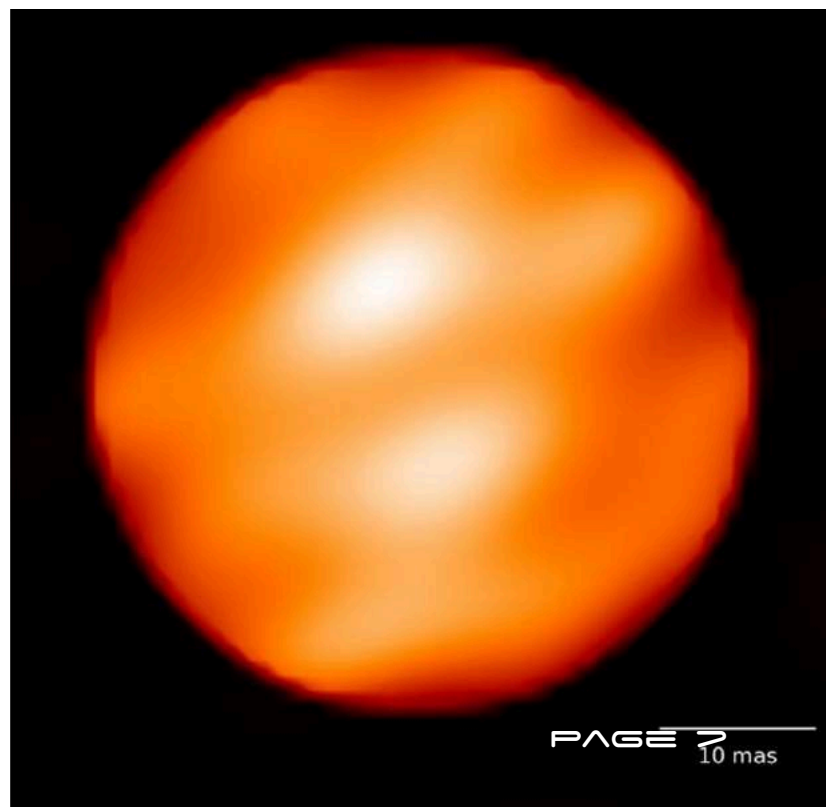
Also in 2016, new observations showed the gas moving away from Betelgeuse was much colder than expected by astronomers. The big puzzle here being whatever mechanism is at work ejecting so much mass from Betelgeuse without generating a lot of heat. Explanations suggested involve magnetic fields, shockwaves, or eruptions of plasma from within the star which fit within the observational data. Graham Harper of the University of Colorado at Boulder told Calla Cofield at *Space.Com*, "[I]t might it's a combination of all sorts of things and it's just somehow fooling us in a very bad way." Adding fuel to speculation about the mysterious nature of Betelgeuse, its brightness has dropped from magnitude 0.5 to 1.5 between October 2019 and December 2019.

If Betelgeuse already exploded within the past 500 years, so humans can observe the event, what will happen to the night sky? Best

estimates for Betelgeuse's demise suggest it will be a Type II-P supernova. These kinds of supernova tend to endure in the sky, rather than winking out into a newborn nebula. Should Betelgeuse go supernova, it would have a peak apparent magnitude of -12.4 which is a bit brighter than a full moon and would be visible in the daytime for about 2-3 months before fading away. Most grayface scientists, skeptics, and astronomers reckon Betelgeuse probably won't go supernova for another 100,000 years, but anything can and will happen. After the spectacle has died down and humans resume monitoring the Kardashians on *InstaGram*, Betelgeuse will be adapting to a new phase of existence as a neutron star or black hole.

Until that time comes to pass, keep an eye out for the constellation Orion between the months of August and April and find Betelgeuse at RA 05h 55m 10.30536s and DEC+07° 24' 25.4304". That's the right "shoulder" of Orion to lay people. If the fortunes smile upon you, maybe you or your descendants will catch first light of Betelgeuse's demise.

Star spots visible on the surface of Betelgeuse. Image credit: 2010 Haubois / Perrin (LESIA, Observatoire de Paris)



CLUB BENEFITS

OBSERVING CALENDAR

January 3-4 - Quadrantids Meteor Shower. An average meteor shower with up to 40 meteors per hour at its peak. It's made up of the leftovers from a comet known as 2003 EH1. Thanks to an early-setting first quarter moon, this event should be visible to all. The radiate for this meteor shower is in the constellation of Boötes.

January 10 - Full moon at 2:21 p.m..

January 20 - Conjunction of the Moon and Mars. Earth's moon will pass $2^{\circ}15'$ to the north of the planet Mars in the constellation of Scorpius. The show begins around 3:56 a.m., reaching an altitude of 23° above the southeastern horizon before fading in the dawn's early light.

January 24 - New Moon at 4:41 p.m..

January 28 - Close approach of the Moon, Venus, and Neptune. Talk about a threesome! Earth's moon, and the planets Venus and Neptune will pass within $3^{\circ}49'$ of each other. The show begins around 5:26 p.m. about 30° above the southwestern horizon then set at 8:26 p.m.. Venus will shine at -4.1 magnitude and Neptune will be a paltry 7.9 magnitude with a nearby sliver of the Moon in the constellation of Aquarius.

WHY JOIN?

For \$15.00 a year, you can enjoy many benefits with the Astronomical Society of the Toms River Area. Members can borrow A.S.T.R.A.'s telescopes for observations, have access to private star parties, access to Island Beach State Park permits, in addition to camaraderie with local amateur astronomers. Contact one of our club officers today to join the fun.

ISLAND BEACH STATE PARK PERMITS

One of the perks of being an ASTRA member is the special permit for after-hours stargazing at Island Beach State Park. Please contact the executive board for more details about how you can acquire your 2020 permit.

ASTRA'S TELESCOPES

ASTRA has several different types of telescopes, telescope mounts, along with binoculars, eyepieces, and eyepiece filters available for members to borrow. If any member is interested, please check out ASTRA's website and contact John Endreson at telescope-loan@astra-nj.org, or 609-971-3331.

VOLUNTEER PRESENTERS

Members are invited to give presentations related to astronomy or space science at our monthly meetings. Please contact a club officer to make arrangements.