

The Focal Point

Vol. 29 No. 11

The Atlanta Astronomy Club
Established 1947
April 2017

Editor: Tom Faber

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April AAC General Meeting

Important Note - Location and Time Change!

Please join us for the next general meeting of the Atlanta Astronomy Club, to be held on Saturday, April 15th starting at 7:00 PM. The meeting will be held at the Atlanta Freethought Hall, 4775 North Church Lane S.E., Atlanta/Smyrna. North Church Lane is located off of Atlanta Road, which is exit 16 on I-285. Note that there is road construction in this area so allow extra time for traffic congestion. Our speaker this month will be AAC president Mark Banks. Marks will present a talk about the Drake Equation.

The Talk

The Drake Equation, then & now. In 1960 Astronomer Frank Drake created his now famous equation. It was an attempt to determine how many technologically advanced civilizations capable of communicating with us are in our galaxies. We have learned a lot since 1960 but we still have a lot of unanswered questions. Let's see if we can determine how many aliens are out there.

Our Speaker

Mark Banks became interested in Astronomy in 1957 when Sputnik was launched. The reaction at the time was very alarming. Most people thought this was a major escalation of the cold war. During the following years Mark had a front row seat to the Mercury, Gemini & Apollo projects to beat the Russians to the moon. During this time he studied the sky with binoculars then a telescope. After serving in the Air Force and acquiring a B.S. in electrical engineering he had a career in the aerospace industry working in avionics. Now retired, he is President of the Atlanta Astronomy Club.

After the program we will be able to do some observing (weather permitting) so bring your telescope and we will look at some heavenly bodies together.

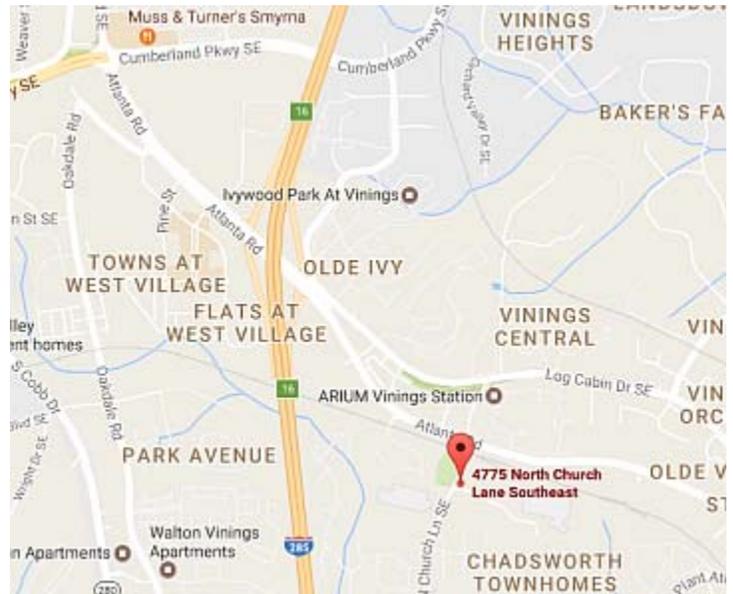
March was Membership Renewal Month

The AAC has moved to a "one-date-for-all" membership renewal. ALL CLUB MEMBERS, with certain exceptions, should submit their \$30 dues for 2017 by the end of March. Please send your renewals to AAC Treasurer Sharon Carruthers, renew online using PayPal, or you can bring your renewal to the April Meeting. For more information see: http://atlantaastronomy.org/?page_id=22

Thank You for your support of the AAC!

For additional meeting information go to www.meetup.com/Atlanta-astronomy-club-meetup/

Please join us for this very interesting and informative talk. All Astronomy club events are free and open to the public. For more information on the Club go to www.atlantaastronomy.org



Credit: Google Maps

March Meeting Report

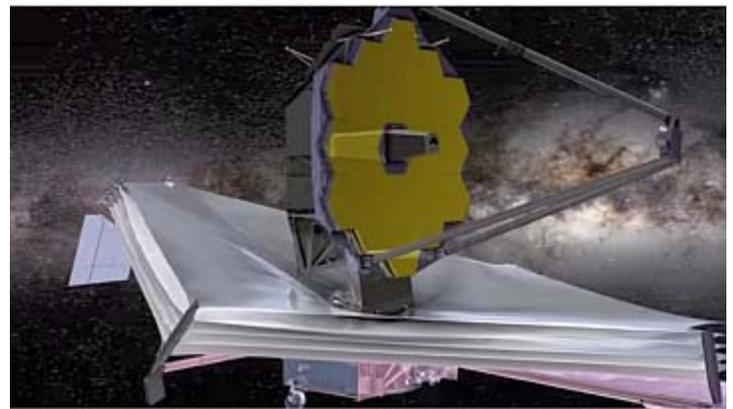
Photos by Tom Faber unless noted

The March AAC general meeting was held on Saturday, March 18th at Emory University's Math and Science Building. The meeting was held in conjunction with the Atlanta Science Festival and Northrup Grumman Corporation. Over 100 members and guests were present for this meeting (photos below). For the first part of the meeting we watched a video titled *Into the Unknown: The James Webb Space Telescope* (<http://www.northropgrumman.com/CorporateResponsibility/CorporateCitizenship/Education/IntoTheUnknown/Pages/default.aspx>) about the design development of the next generation space telescope. After we viewed this 40 minute video there was a panel discussion about the James Webb Space Telescope and the astronomical observations it will conduct. Panel members were: Dr. Misty Bentz of Georgia State University, Dr. Erin Bonning of Emory University, Tom Faber with the Atlanta Astronomy Club (right to left in photos on next page), and joining us on Skype Martin (Marty) Fredrick from Northrup Grumman Corporation. The panel discussion session lasted for well over one hour.

After the program, club officers then announced upcoming AAC events and activities. Then a number of us went to a nearby restaurant for late dinner and more conversations.



AAC President Mark Banks and Alex Langoussis



CGI of the deployed JWST from *Into the Unknown*.



Photo above by Paul Peterson.



The Next Charlie Elliott Meeting

Meeting Details

Please join us on April 22, 2017 at 4:30 p.m. for our meeting! Details of the meeting and talk are TBA. Check here for updates: <http://ceastronomy.org/blog/home>

All of the Above!

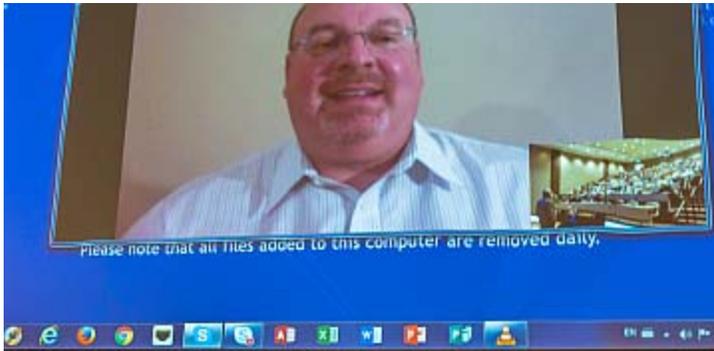
Charlie Elliott Astronomy Observing Supervisor David Whalen will reprise his stand up comedy routine and might even talk about what you can expect to see in the sky this month with binoculars and small telescopes, as well as the monthly observing challenge.

Observing After the Meeting

All are invited to Jon Wood Astronomy Field immediately after the meeting (weather-permitting). The event is free and everyone is welcome.

Minutes & Handouts: The minutes, handouts, and presentations from past meetings of Charlie Elliott Astronomy are available for download on our Past Events web page, <http://ceastronomy.org/blog/events>. Monthly sky maps are available from skymaps.com.

Future meetings are on: May 27, June 24 (potluck), July 22.



Above photos are by Paul Peterson.

The AAC Zombie Party

By Daniel Herron, AAC Observing Chair

This year's Zombie Party is scheduled for Thursday, April 27 thru Sunday, April 30 (3 nights) at the Deerlick Astronomy Village. The Zombie party is a no-frills, open to the public, 3 night star party hosted by the Atlanta Astronomy Club. No speakers, workshops, or sessions - just observing. This event is open to all, beginners and experts alike, AAC members, and non-members (how else are we going to get you hooked!). The event is \$15 per person per night due upon arrival, no refunds for bad weather once paid. See you there!

Weather:

General rule if the weather looks to be rainy during the night we will just cancel for that night and start the party the next day. I will make the go/no-go decision for Thursday by Wednesday night.

Note:

The Zombie party got its name from the way we all look the next morning after staying awake all night observing and has nothing to do with the undead that are occasionally rumored to walk the area!

The Astronomical League

As a member of the **Atlanta Astronomy Club** you are automatically also a member of the **Astronomical League**, a nation wide affiliation of astronomy clubs. Membership in the AL provides a number of benefits for you. They include:

- * You will receive *The Reflector*, the AL's quarterly newsletter.
- * You can use the Book Service, through which you can buy astronomy-related books at a 10% discount.
- * You can participate in the Astronomical League's Observing Clubs. The Observing Clubs offer encouragement and certificates of accomplishment for demonstrating observing skills with a variety of instruments and objects. These include the Messier Club, Binocular Messier Club, the Herschel 400 Club, the Deep Sky Binocular Club, and many others.

To learn more about the Astronomical League and its benefits for you, visit <http://www.astroleague.org>

From the President's Desk

By Mark Banks, AAC President

Our March meeting was a great success. We partnered with Northrop Grumman and The Atlanta Science Festival for our program about the James Webb Space Telescope. We hope to have similar future collaborations to help us educate the public and encourage the next generation of science nerds.

Meeting space: We are seeking a new place to have our monthly meeting. We would like to find a place that would enable us to meet in the evening around 7PM and then set up scope for stargazing after the meeting. Anyone who may have any ideas or suggestions about a good place to meet should contact any club officer and let us know.

Elections: Club elections are coming up in May. If you want to run for office or would like to nominate someone please contact any club officer. All positions are available so don't hesitate. The club is what the members make it and you can get involved with the leadership.

Georgia Regional Astronomers Meeting

All members of the Atlanta Astronomy Club are invited to the next Georgia Regional Astronomy Meeting (GRAM) to be held Friday and Saturday, October 27 and 28, at the University of Georgia in Athens. The event is free and there is no registration fee. That weekend's UGA football game with Florida will be in Jacksonville, Florida, so traffic and parking in Athens will be light.

Also participating will be members of the Assn of Lunar & Planetary Observers, who will present several papers and hold an awards dinner on Saturday evening to which all are invited.

The GRAM event will begin with an informal get-together on Friday evening at the UGA Physics Building and observing through the UGA's 24-inch telescope also located at there (weather permitting).

Papers on various aspects astronomical research, education and amateur topics will be presented at the Physics Building from 9 a.m. to 5 p.m. Those with table-top poster presentations are also invited set them up.

The ALPO awards dinner will be held at the UGA Center for Continuing Education & Hotel from 6:30 to 8:30 p.m., and feature Professor of Astronomy at UGA, Dr. Loris Magnani as the keynote speaker. While there is no registration fee for the meeting, pre-registration for the awards dinner will be required so proper arrangements can be made.

Finally, a block of rooms at the UGA Center for reduced rates is being secured for those who prefer to lodge there overnight Friday and/or Saturday.

The GRAM itself was started in 2002 by Dr. Chris DePree (Bradley Observatory at Agnes Scott College) and Dr. Magnani as a time for astronomers in and near Georgia to get together and meet one another. The GRAM is open to anyone with an interest in astronomy (amateurs, too!). The yearly meetings -- usually held in the fall -- feature both oral and poster presentations on research, education, and amateur topics. Previous GRAM events have been held at Agnes Scott College, Berry College, Emory University, UGA, Valdosta State University, Georgia Perimeter College, North Georgia College & State University (now part of the University of North Georgia), Georgia Tech, Georgia Southern University (Statesboro), Columbus State University, Tellus Museum, Georgia College & State University (Milledgeville) and Georgia State University.

For information about the GRAM event, e-mail Dr. Magnani at loris@physast.uga.edu

For information about the ALPO awards dinner and lodging arrangements, e-mail ken.poshedly@alpo-astronomy.org

The AAC at AnachroCon

AnachroCon is a history/alternate history/science fiction/steampunk convention held in Atlanta every February (<http://www.anachrocon.org>). AnachroCon has a number of tracks of various panel discussions. AAC member Richard Jakiel organizes the science track panels. There were several astronomy and space related panels as part of the science track and AAC members set up telescopes for attendees to do daytime solar observing and nighttime observing. Here Rich is running a panel discussion about the upcoming total solar eclipse in August. Photo by Marie Lott.



Gravitational Wave Kicks Monster Black Hole Out Of Galactic Core

NASA/STScI News Release - March 23, 2017

Astronomers have uncovered a supermassive black hole that has been propelled out of the center of a distant galaxy by what could be the awesome power of gravitational waves.

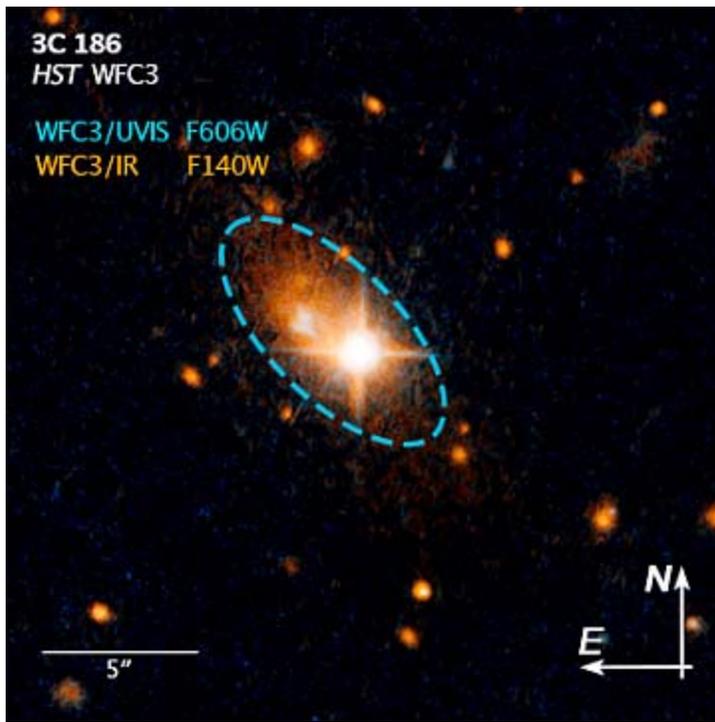
Though there have been several other suspected, similarly booted black holes elsewhere, none has been confirmed so far. Astronomers think this object, detected by NASA's Hubble Space Telescope, is a very strong case. Weighing more than 1 billion suns, the rogue black hole is the most massive black hole ever detected to have been kicked out of its central home.

Researchers estimate that it took the equivalent energy of 100 million supernovas exploding simultaneously to jettison the black hole. The most plausible explanation for this propulsive energy is that the monster object was given a kick by gravitational waves unleashed by the merger of two hefty black holes at the center of the host galaxy.

First predicted by Albert Einstein, gravitational waves are ripples in space that are created when two massive objects collide. The ripples are similar to the concentric circles produced when a hefty rock is thrown into a pond. Last year, the Laser Interferometer Gravitational-Wave Observatory (LIGO) helped astronomers prove that gravitational waves exist by detecting them emanating from the union of two stellar-mass black holes, which are several times more massive than the sun.

Hubble's observations of the wayward black hole surprised the research team. "When I first saw this, I thought we were seeing something very peculiar," said team leader Marco Chiaberge of the Space Telescope Science Institute (STScI) and Johns Hopkins University, in Baltimore,

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Credits: NASA, ESA, and M. Chiaberge (STScI and JHU)

Maryland. “When we combined observations from Hubble, the Chandra X-ray Observatory, and the Sloan Digital Sky Survey, it all pointed towards the same scenario. The amount of data we collected, from X-rays to ultraviolet to near-infrared light, is definitely larger than for any of the other candidate rogue black holes.”

Chiaberge’s paper will appear in the March 30 issue of *Astronomy & Astrophysics*.

Hubble images taken in visible and near-infrared light provided the first clue that the galaxy was unusual. The images revealed a bright quasar, the energetic signature of a black hole, residing far from the galactic core. Black holes cannot be observed directly, but they are the energy source at the heart of quasars - intense, compact gushers of radiation that can outshine an entire galaxy. The quasar, named 3C 186, and its host galaxy reside 8 billion light-years away in a galaxy cluster. The team discovered the galaxy’s peculiar features while conducting a Hubble survey of distant galaxies unleashing powerful blasts of radiation in the throes of galaxy mergers.

“I was anticipating seeing a lot of merging galaxies, and I was expecting to see messy host galaxies around the quasars, but I wasn’t really expecting to see a quasar that was clearly offset from the core of a regularly shaped galaxy,” Chiaberge recalled. “Black holes reside in the center of galaxies, so it’s unusual to see a quasar not in the center.”

The team calculated the black hole’s distance from the core by comparing the distribution of starlight in the host galaxy with that of a normal elliptical galaxy from a computer model. The black hole had traveled more than 35,000 light-years from the center, which is more than the distance between the sun and the center of the Milky Way.

Based on spectroscopic observations taken by Hubble and the Sloan survey, the researchers estimated the black hole’s mass and measured the speed of gas trapped near the behemoth object. Spectroscopy divides light into its component colors, which can be used to measure velocities in space. “To our surprise, we discovered that the gas around the black hole was flying away from the galaxy’s center at 4.7 million miles an hour,” said team member Justin Ely of STScI. This measurement is also a gauge of the black hole’s velocity, because the gas is gravitationally locked to the

monster object.

The astronomers calculated that the black hole is moving so fast it would travel from Earth to the moon in three minutes. That’s fast enough for the black hole to escape the galaxy in 20 million years and roam through the universe forever.

The Hubble image revealed an interesting clue that helped explain the black hole’s wayward location. The host galaxy has faint arc-shaped features called tidal tails, produced by a gravitational tug between two colliding galaxies. This evidence suggests a possible union between the 3C 186 system and another galaxy, each with central, massive black holes that may have eventually merged.

Based on this visible evidence, along with theoretical work, the researchers developed a scenario to describe how the behemoth black hole could be expelled from its central home. According to their theory, two galaxies merge, and their black holes settle into the center of the newly formed elliptical galaxy. As the black holes whirl around each other, gravity waves are flung out like water from a lawn sprinkler. The hefty objects move closer to each other over time as they radiate away gravitational energy. If the two black holes do not have the same mass and rotation rate, they emit gravitational waves more strongly along one direction. When the two black holes collide, they stop producing gravitational waves. The newly merged black hole then recoils in the opposite direction of the strongest gravitational waves and shoots off like a rocket.

The researchers are lucky to have caught this unique event because not every black-hole merger produces imbalanced gravitational waves that propel a black hole in the opposite direction. “This asymmetry depends on properties such as the mass and the relative orientation of the black holes’ rotation axes before the merger,” said team member Colin Norman of STScI and Johns Hopkins University. “That’s why these objects are so rare.”

An alternative explanation for the offset quasar, although unlikely, proposes that the bright object does not reside within the galaxy. Instead, the quasar is located behind the galaxy, but the Hubble image gives the illusion that it is at the same distance as the galaxy. If this were the case, the researchers should have detected a galaxy in the background hosting the quasar.

If the researchers’ interpretation is correct, the observations may provide strong evidence that supermassive black holes can actually merge. Astronomers have evidence of black-hole collisions for stellar-mass black holes, but the process regulating supermassive black holes is more complex and not completely understood.

The team hopes to use Hubble again, in combination with the Atacama Large Millimeter/submillimeter Array (ALMA) and other facilities, to more accurately measure the speed of the black hole and its gas disk, which may yield more insight into the nature of this bizarre object.

The Hubble Space Telescope is a project of international cooperation between NASA and ESA (European Space Agency). NASA’s Goddard Space Flight Center in Greenbelt, Maryland, manages the telescope. The Space Telescope Science Institute in Baltimore conducts Hubble science operations. STScI is operated for NASA by the Association of Universities for Research in Astronomy, Inc., in Washington, D.C.



Hubble Discovery of Runaway Star Yields Clues to Breakup of Multiple-Star System

NASA/STScI News Release - March 17, 2017

As British royal families fought the War of the Roses in the 1400s for control of England's throne, a grouping of stars was waging its own contentious skirmish — a star wars far away in the Orion Nebula.

The stars were battling each other in a gravitational tussle, which ended with the system breaking apart and at least three stars being ejected in different directions. The speedy, wayward stars went unnoticed for hundreds of years until, over the past few decades, two of them were spotted in infrared and radio observations, which could penetrate the thick dust in the Orion Nebula.

The observations showed that the two stars were traveling at high speeds in opposite directions from each other. The stars' origin, however, was a mystery. Astronomers traced both stars back 540 years to the same location and suggested they were part of a now-defunct multiple-star system. But the duo's combined energy, which is propelling them outward, didn't add up. The researchers reasoned there must be at least one other culprit that robbed energy from the stellar toss-up.

Now NASA's Hubble Space Telescope has helped astronomers find the final piece of the puzzle by nabbing a third runaway star. The astronomers followed the path of the newly found star back to the same location where the two previously known stars were located 540 years ago. The trio reside in a small region of young stars called the Kleinmann-Low Nebula, near the center of the vast Orion Nebula complex, located 1,300 light-years away.

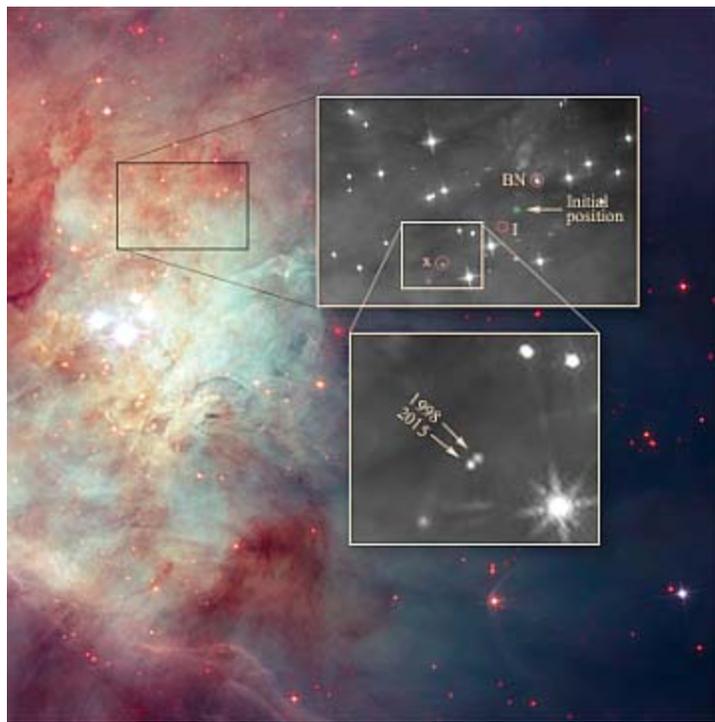
"The new Hubble observations provide very strong evidence that the three stars were ejected from a multiple-star system," said lead researcher Kevin Luhman of Penn State University in University Park, Pennsylvania. "Astronomers had previously found a few other examples of fast-moving stars that trace back to multiple-star systems, and therefore were likely ejected. But these three stars are the youngest examples of such ejected stars. They're probably only a few hundred thousand years old. In fact, based on infrared images, the stars are still young enough to have disks of material leftover from their formation."

All three stars are moving extremely fast on their way out of the Kleinmann-Low Nebula, up to almost 30 times the speed of most of the nebula's stellar inhabitants. Based on computer simulations, astronomers predicted that these gravitational tugs-of-war should occur in young clusters, where newborn stars are crowded together. "But we haven't observed many examples, especially in very young clusters," Luhman said. "The Orion Nebula could be surrounded by additional fledging stars that were ejected from it in the past and are now streaming away into space."

The team's results will appear in the March 20, 2017 issue of *The Astrophysical Journal Letters*.

Luhman stumbled across the third speedy star, called "source x," while he was hunting for free-floating planets in the Orion Nebula as a member of an international team led by Massimo Robberto of the Space Telescope Science Institute in Baltimore, Maryland. The team used the near-infrared vision of Hubble's Wide Field Camera 3 to conduct the survey. During the analysis, Luhman was comparing the new infrared images taken in 2015 with infrared observations taken in 1998 by the Near Infrared Camera and Multi-Object Spectrometer (NICMOS). He noticed that source x had changed its position considerably, relative to nearby stars over the 17 years between Hubble images, indicating the star was moving fast, about 130,000 miles per hour.

The astronomer then looked at the star's previous locations, projecting its path back in time. He realized that in the 1470s source x had been near the



This dramatic view of the center of the Orion Nebula reveals the home of three speedy, wayward stars that were members of a now-defunct multiple-star system. The stellar grouping broke apart 500 years ago, flinging the three stars out of their birthplace.

The image, taken by NASA's Hubble Space Telescope, combines observations taken in visible light with the Advanced Camera for Surveys and in near-infrared light with the Wide Field Camera 3. A grouping of hefty, young stars, called the Trapezium Cluster, is at the center of the image. Several hundred stars are sprinkled throughout the image. Many of them appear red because their light is being scattered by dust.

The box just above the Trapezium Cluster outlines the location of the three stars. A Hubble close-up view of the stars is shown at top right. The birthplace of the multi-star system is marked "initial position." Two of the stars — labeled BN, for Becklin-Neugebauer, and "I," for source I — were discovered decades ago. Source I is embedded in thick dust and cannot be seen. The third star, "x," for source x, was recently discovered to have moved noticeably between 1998 and 2015, as shown in the inset image at bottom right. Source x is traveling at an unusually high speed of 130,000 miles per hour, which is 30 times faster than the velocity of most stars in the nebula.

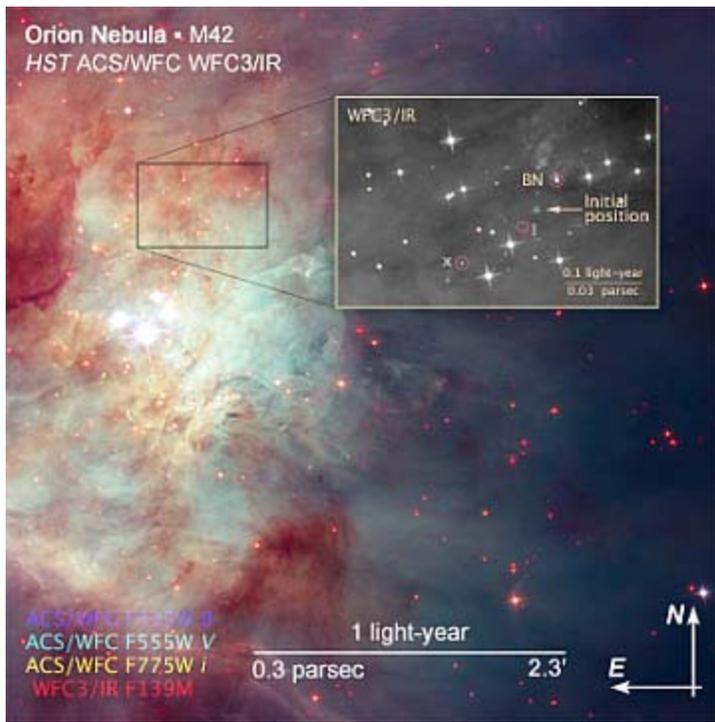
Astronomers found the speedy source x by comparing observations taken in 1998 by the Near Infrared Camera and Multi-Object Spectrometer with those taken in 2015 by the Wide Field Camera 3. Hubble's discovery of the high velocity of source x has helped astronomers solve the long-standing mystery of how the stars BN and source I acquired their fast motions.

Credits: NASA, ESA, K. Luhman (Penn State University), and M. Robberto (STScI)

same initial location in the Kleinmann-Low Nebula as two other runaway stars, Becklin-Neugebauer (BN) and "source I."

BN was discovered in infrared images in 1967, but its rapid motion wasn't detected until 1995, when radio observations measured the star's speed at 60,000 miles per hour. Source I is traveling roughly 22,000 miles per hour. The star had only been detected in radio observations; because it is so heavily enshrouded in dust, its visible and infrared light is largely blocked.

Continued on next page



Credits: NASA, ESA, and STScI

The three stars were most likely kicked out of their home when they engaged in a game of gravitational billiards, Luhman said. What often happens when a multiple system falls apart is that two of the member stars move close enough to each other that they merge or form a very tight binary. In either case, the event releases enough gravitational energy to propel all of the stars in the system outward. The energetic episode also produces a massive outflow of material, which is seen in the NICMOS images as fingers of matter streaming away from the location of the embedded source I star.

Future telescopes, such as the James Webb Space Telescope, will be able to observe a large swath of the Orion Nebula. By comparing images of the nebula taken by the Webb telescope with those made by Hubble years earlier, astronomers hope to identify more runaway stars from other multiple-star systems that broke apart.

The **Atlanta Astronomy Club, Inc.**, one of the South's largest and oldest astronomical society, meets at **3:00 P.M.** on the 2nd Saturday of each month at the Fernbank Science Center in Decatur, or occasionally at other locations or times. Membership fees are **\$30** for a family or single person membership. College Students membership fee is **\$15**. These fees are for a one year membership.

Magazine subscriptions to *Sky & Telescope* or *Astronomy* can be purchased through the club for a reduced rate. The fees are **\$33** for *Sky & Telescope* and **\$34** for *Astronomy*. Renewal forms will be sent to you by the magazines. Send the renewal form along with your check to the Atlanta Astronomy Club treasurer.

The Club address: Atlanta Astronomy Club, Inc., P.O. Box 76155, Atlanta, GA 30358-1155. AAC Web Page: <http://www.AtlantaAstronomy.org>. Send suggestions, comments, or ideas about the website to webmaster@AtlantaAstronomy.org. Also send information on upcoming observing events, meetings, and other events to the webmaster.

Atlanta Astronomy Club Online

While this newsletter is the official information source for the Atlanta Astronomy Club, it is only up to date the day it is posted. So if you want more up to date information, go to our club's website. The website contains pictures, directions, membership applications, events, updates, and other information. <http://www.atlantaastronomy.org> You can also follow the AAC on Facebook by joining the AAC group, and on Twitter at <http://twitter.com/atlaastro>.

AAC Officers and Contacts

President: Mark Banks President@AtlantaAstronomy.org

Program Chair: Open Programs@AtlantaAstronomy.org

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PSSG Chairman: Peter Macumber pmacumber@nightsky.org

PSSG Co-Chair: Open

Sidewalk Astronomy: Brad Isley
sidewalkastronomy@AtlantaAstronomy.org

Light Tresspass: Ken Edwards, Contact info TBA

Woodruff Observ. Coordinator: Sharon Carruthers
Treasurer@AtlantaAstronomy.org

AAC Webmaster: Daniel Herron
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Calendar by Tom Faber (Times EDT/EST unless noted)

AAC Events are listed in BOLD

- Apr 1st, Saturday: Mercury at Greatest Eastern Elongation.
- Apr 3rd, Monday: Moon First Quarter.
- Apr 6th, Thursday: Moon near Regulus.
- Apr 7th, Friday: Jupiter at Opposition.
- Apr 10th, Monday: Moon near Jupiter.
- Apr 11th, Tuesday: Full Moon.
- Apr 15th, Saturday: **AAC meeting location AFS Building 7PM.**
- Apr 16th, Sunday: Moon near Saturn.
- Apr 19th, Wednesday: Moon Last Quarter.
- Apr 20th, Thursday: Mercury at Inferior Conjunction.
- Apr 21st, Friday: Mars near Pleiades.
- Apr 22nd, Saturday: **CE Chapter Meeting.** April Lyrids Meteor Shower.
- Apr 26th, Wednesday: New Moon.
- Apr 27th, Thursday - Apr 30th, Sunday: **AAC Zombie Party**
- Apr 29th, Saturday: Astronomy Day
- May 2nd, Tuesday: Moon First Quarter.
- May 6th, Saturday: Eta Aquarids Meteor Shower.
- May 10th, Wednesday: Full Moon.
- May 17th, Wednesday: Mercury at Greatest Western Elongation.
- May 18th, Thursday: Moon Last Quarter.
- May 20th, Saturday: **AAC meeting location TBA.**
- May 25th, Thursday: New Moon.
- May 27th, Saturday: **CE Chapter Meeting.**

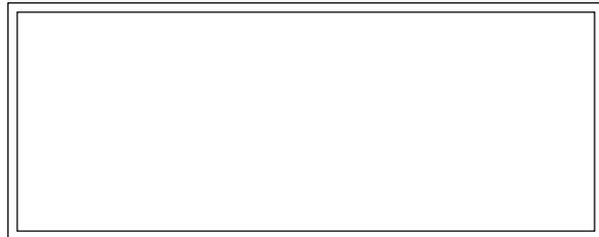
For more event listings see the calendar at www.atlantaastronomy.org

Atlanta Astronomy Club Listserv

Subscribe to the Atlanta Astronomy Club Mailing List: The name of the list is: AstroAtlanta. The address for messages is: AstroAtlanta@yahoogroups.com . To add a subscription, send a message to: AstroAtlanta-subscribe@yahoogroups.com .

Focal Point Deadline and Submission Information

Please send articles, pictures, and drawings in electronic format on anything astronomy, space, or sky related to Tom Faber at focalpoint@atlantaastronomy.org. Please send images separate from articles, not embedded in them. Articles are preferred as plain text files with images separate but Word documents or PDFs are okay. **The deadline for May is Saturday, April 22. Submissions received after the deadline will go in the following issue.**



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www.atlantaastronomy.org

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Tom Faber

FROM:

Newsletter of The Atlanta Astronomy Club, Inc.

