The Focal Point

Vol. 25 No. 1

The Atlanta Astronomy Club
Established 1947
June 2012

Editor: Tom Faber

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June General Meeting

Join us for the June meeting of the Atlanta Astronomy Club on Friday, June 15th at 8PM. The meeting will take place in the Parlor Room of the Hitson Center of the Sandy Springs Methodist Church, 86 Mt Vernon Hwy, NE, Sandy Springs, GA 30328 (see map on right). Refreshments will be provided starting around 7:30PM.

The Program:

Our guest speaker will be Annette Michel. Annette will present a talk titled "Supermassive Black Holes and Astronomy Research in Georgia schools."

This will be a two part talk where I first will take you on a journey to discover what supermassive black holes are, how we measure them and how we calculate their masses. The second part I will talk about some ideas to bring astronomy research in to public schools in Georgia.

In every galaxy, including the Milky Way, there is a supermassive black hole (SMBH) in the center. We want to know more about them and how they affect galaxy evolution. There are three variables we can study about black holes; their spin, their charge and their mass. The research I have been involved in is determinations of the masses of SMBH of Active Galactic Nuclei in Seyfert galaxies. Seyfert galaxies are a class of galaxies with nuclei that produce spectral line emission from highly ionized gas, named after the astronomer who identified the class, Carl Keenan Seyfert. Seyfert galaxies harbor SMBH's with masses between 107 and 108 solar masses. As an interactive part of my talk we are going to take a known Seyfert galaxy and measure the mass of its super massive black hole together as a group so I hope everyone brings a calculator.

For the second part of my talk I will share some interesting information I gathered from my trip to the 2012 AAS meeting pertaining to public school education. In 2012 I received an NSF grant to complete a master's

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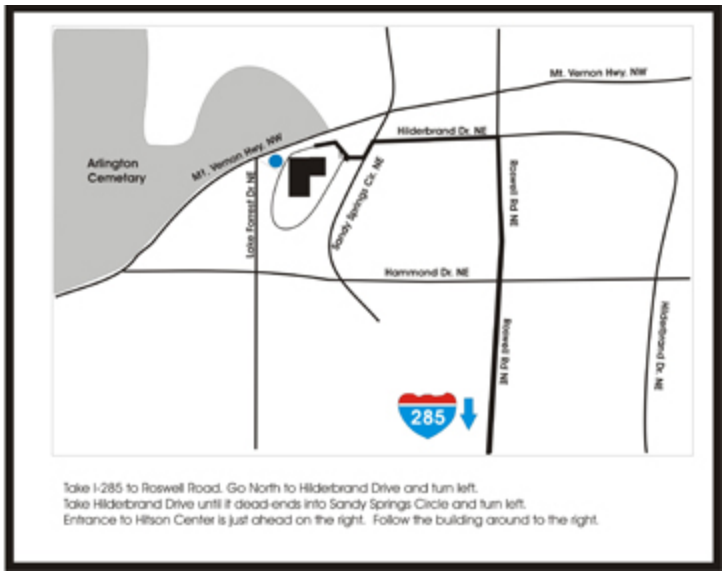


Remembering Art Zorka

The Atlanta Astronomy Club lost one of its most active members on May 16 with the passing of Art Zorka. Art was a member of the AAC for over 15 years and served the club in a number of ways. He had served as the AAC's Astronomical League correspondent for several years and was finishing up a term as the club's observing chair. Art participated in many public outreach events, helped secure the club's new meeting location at the Hitson Center in Sandy Springs, and was the AAC's coordinator for the NASA Night Sky Network. Art was a prolific observer, having earned over 12 of the Astronomical League's observing program awards including the Messier program, Binocular Messier, Binocular Deep Sky, the Herschel program, and the Master Observer award. For many years Art worked as motivational speaker and magician, and prior to that worked as videographer for Georgia Public Television. For more about Art's life see: http://www.ajc.com/news/art-zorka-70-magician-1448728.html . Ad astra Art! You will be greatly missed!

Photos by Maria Zorka

in education so I can become a high school physics/astronomy teacher in high need public schools in Georgia focusing on bringing astronomy research in to the class room. There are two different programs that can help facilitate this: The NASA/IPAC Teacher Archive Research Program and The SOFIA Airborne Astronomy Ambassadors Program. Both these programs aspire to improve teaching, inspire students, and inform the community.

Our Speaker:

My name is Annette Michel, I am 33 years old and I study physics at Georgia State University. I will graduate with a bachelor in physics in spring of 2013 and start my masters of education in the following summer. I was born and raised in Bergen, Norway and immigrated to the US in 2007 where I live with my husband Pierre and our two cats Rusty and Jax. My husband and I became members of the Atlanta Astronomy Club in 2008 and we love amateur astronomy. We recently ventured in to wonderful field of astrophotography and are having fun with all the frustrations that entails.

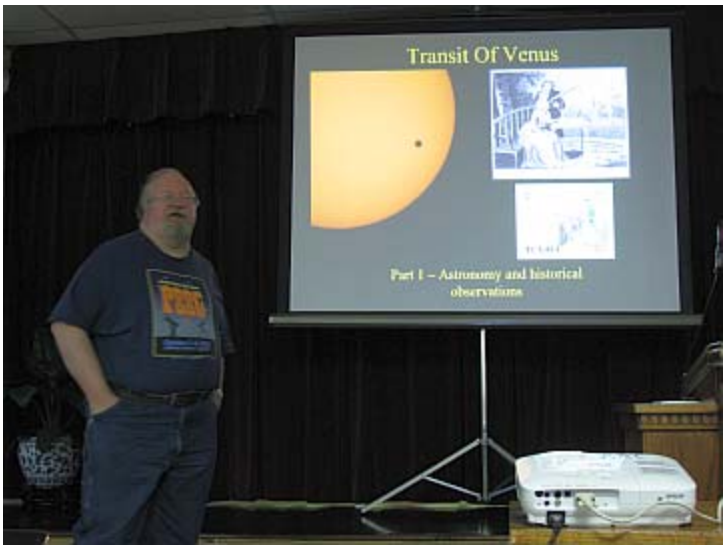
Upcoming AAC Meetings:

Our meetings will usually be held on the 3rd Friday of the month. Future meeting dates for 2012 are July 20, Aug 17, Sept 21, Oct 19, and Nov 16. The date for December Christmas potluck is TBA. Meetings will be at the Parlor Room of the Hitson Center unless noted otherwise.

May Meeting Report

Photos by Tom Faber

The May meeting of the Atlanta Astronomy Club took place on May 18 at the Sandy Springs United Methodist Church Fellowship Hall (photo below) across the street from our usual meeting location at the Hitson Center. About 35 members and guests were present. The meeting was a very somber event due to the news that long time club member and Observing chair Art Zorka had passed away just two days earlier. Art was to be our speaker for the night presenting a talk about the upcoming transit of Venus. Richard Jakiel and Dan Llewellyn hurriedly put together talks for the night, Rich talking about the history of observing Venus Transits (photo top right) and Dan talking about imaging it (middle photo). Pixie Bruner (photo bottom) talked about Art and his upcoming memorial service on June 3. After the talks we held elections for club officers. Art was going to run for President and to honor Art we elected him President pending selection of a new President at the June BoD meeting. Daniel Herron was elected Observing Chair, and the other club offices will be held by the same members as in the past year. After the meeting a number of us went to the nearby Mellow Mushroom for food, drink, and socializing.



CE Chapter Outreach April & May

By Theo Ramakers, Outreach Coordinator

http://ceastronomy.org/tramakers

The Chapter did five outreach events for schools and clubs during April: A Star Party for East Newton Elementary School at the Jon Wood Field, a solar event for KATE's Club at CEWC, A full day at McConnel Middle School in Grayson, and a second full day at East Newton Elementary. We also participated in another STEM Festival, this time for Scott Elementary School in NW Atlanta.

In May we were able to have six events: A full day Solar event for Trickum Middle School in Stone Mountain, our yearly participation in JAKES Day at CE, a three day event for 12 six grade classes at Memorial Middle School and finally on the last day of school a solar event for Grayson Elementary School. Several events had to be cancelled because of cloudy conditions for Solar Events and we hope to catch up with these when the school starts again in the fall. Thanks to all members who gave their time to reach out to the next generation of scientists.

Charlie Elliott Chapter June 16 Meeting

Join us for our next meeting at 5 p.m., Saturday, June 16 at Charlie Elliott Wildlife Center's Visitor Center.

Meeting Agenda

Feature Presentation: Pot-Luck Dinner and a Movie - It's time for another "Dinner and a Movie" meeting. Bring your favorite entree or dessert, or just bring your appetite - everyone is welcome. Movie: Enjoy an astronomy related documentary while having dinner!

This Month's Sky

A short program of special objects conveniently placed in the night sky over the next month will be presented by the CE chapter observing supervisor. After the main programs, and if the meeting runs extra-long, a "Sunset Time Alert" will be announced. While we'd love for everyone to stay for the entire meeting, we also realize that some folks prefer to leave a bit earlier so as to set up their equipment at the observing field before dark. On June 16, sunset will occur at 20:49 p.m. EDT.

"Observing after the meeting"

All are invited to the observing field immediately after the meeting (weather-permitting). Everyone is welcome. Place: Jon Wood Astronomy Field at Charlie Elliott Wildlife Center

Our Meeting Schedule for the rest of 2012: July 21, August 18, September 15, October 20, November 17, December 15.

Woodruff Boy Scout Summer Camp

SUMMER TIME! SUMMER TIME! SUMMER TIME!

Summer Scout Camping is here again. This is not only our time to "pay the rent" for our access to Woodruff Boy Scout Camp; but also our best opportunity to fulfill our Club mandate to "educate" and "to promote the public knowledge of and interest in astronomy".

Our on-field viewing with the scopes will be on Thursday nights, after dark (from 9:30 – 10 p.m.) Bring your own scope or use the 10"/F6 Discovery Dob in the warm-up shed. We need volunteers to commit to go up on Thursdays, from June 7 – July 26. Please phone or e-mail me if you can commit to one or more of these evenings.

Sharon Carruthers, Treasurer@atlantaAstronomy.org (H) 770-941-4640.

The Next AAC Board Meeting

The next Board meeting of the Atlanta Astronomy Club is scheduled for Sunday, June 17th at 3PM. Location of the meeting is TBD. Contact President Mark Banks or Board Chair Daniel Herron for more information about the meeting agenda.

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

The *Focal Point* Archives

The AAC began publishing the *Focal Point* as a PDF online in June 1998. Since then every issue has, and still is, available for download from the club's web page. Recently that archive has expanded. Sharon Carruthers has scanned 61 issues of the AAC's newsletter (then called *The Atlanta Astronomers' Report*) from 1948 to 1977. Although many issues from this period are still missing these provide a valuable record of the club's early years. In addition I (Tom Faber) came across 19 issues of the *Focal Point* from the years 1995-1998 that I scanned to make available on the club's web site. Again not every issue during this period is available but it is another step in maintaining and making available to all a record of the AAC's history. Our web master Daniel Herron has uploaded these to the web site as PDF's for download. Just visit www.atlantaastronomy.org and click on the "Focal Point Archives" link on the right side of the page. If you have any of the missing issues of the club's newsletter that you would like to scan and submit to Daniel as a PDF please do!

Moon Image by Dan Llewellyn

This Moon image was taken January 10, 2012 with a Nikon D3100 at prime focus through a C-14. The image was processed by Home Brew high dynamic range processing.

Enceladus Plume is a New Kind of Plasma Laboratory

NASA/JPL News Release - May 31, 2012

Recent findings from NASA's Cassini mission reveal that Saturn's geyser moon Enceladus provides a special laboratory for watching unusual behavior of plasma, or hot ionized gas. In these recent findings, some Cassini scientists think they have observed "dusty plasma," a condition theorized but not previously observed on site, near Enceladus.

Data from Cassini's fields and particles instruments also show that the usual "heavy" and "light" species of charged particles in normal plasma are actually reversed near the plume spraying from the moon's south polar region. The findings are discussed in two recent papers in the Journal of Geophysical Research.

"These are truly exciting discoveries for plasma science," said Tamas Gombosi, Cassini fields and particles interdisciplinary scientist based at the University of Michigan, Ann Arbor. "Cassini is providing us with a new plasma physics laboratory."

Ninety-nine percent of the matter in the universe is thought to be in the form of plasma, so scientists have been using Saturn as a site other than Earth to observe the behavior of this cloud of ions and electrons directly. Scientists want to study the way the sun sends energy into Saturn's plasma environment, since that jolt of energy drives processes such as weather and the behavior of magnetic field lines. They can use these data to understand how Saturn's plasma environment is similar to and different from that of Earth and other planets.

The small, icy moon Enceladus is a major source of ionized material filling the huge magnetic bubble around Saturn. About 200 pounds (about 100 kilograms) of water vapor per second - about as much as an active comet - spray out from long cracks in the south polar region known as "tiger stripes." The ejected matter forms the Enceladus plume - a complex structure of icy grains and neutral gas that is mainly water vapor. The plume gets converted into charged particles interacting with the plasma that fills Saturn's magnetosphere.

The nature of this unique gas-dust-plasma mixture has been revealed over the course of the mission with data from multiple instruments, including the Cassini plasma spectrometer, magnetometer, magnetospheric imaging instrument, and the radio and plasma wave science instrument. What scientists found most interesting is that the grains range continuously in size from small water clusters (a few water molecules) to thousandths of an inch (100 micrometers). They also saw that a large fraction of these grains trap electrons on their surface. Up to 90 percent of the electrons from the plume appear to be stuck on large, heavy grains.

In this environment, Cassini has now seen positively charged ions become the small, "light" plasma species and the negatively charged grains become the "heavy" component. This is just the opposite of "normal" plasmas, where the negative electrons are thousands of times lighter than the positive ions.

In a paper published in the December issue of the journal, a team of Swedish and U.S. scientists on the Cassini mission examined radio and plasma wave science instrument observations from four flybys of Enceladus during 2008. They found a high plasma density (both ions and electrons) within the Enceladus plume region, although the electron densities are usually much lower than the ion densities in the plumes and in the E ring. The team concluded that dust particles a hundred millionth to a hundred thousandth of an inch (a nanometer to micrometer) in size are sweeping up the negatively charged electrons. The mass of the observed "nanograins" ranges from a few hundred to a few tens of thousands of atomic mass units (proton masses), and must therefore contain tens to thousands of water molecules bound together. At least half of the negatively charged electrons are attached to the dust, and their interaction with

Cassini imaging scientists used views like this one to help them identify the source locations for individual jets spurting ice particles, water vapor and trace organic compounds from the surface of Saturn's moon Enceladus. Image credit: NASA/JPL/Space Science Institute.

the positively charged particles causes the ions to be decelerated. Because the dust is charged and behaves as part of the plasma cloud, this paper distinguishes this state of matter from dust that just happens to be in plasma. "Such strong coupling indicates the possible presence of so-called 'dusty plasma', rather than the 'dust in a plasma' conditions which are common in interplanetary space," said Michiko Morooka from the Swedish Institute of Space Physics, lead author of the paper and a Cassini radio and plasma wave science co-investigator. "Except for measurements in Earth's upper atmosphere, there have previously been no in-situ observations of dusty plasma in space."

In a dusty plasma, conditions are just right for the dust to also participate in the plasma's collective behavior. This increases the complexity of the plasma, changes its properties and produces totally new collective behavior. Dusty plasma are thought to exist in comet tails and dust rings around the sun, but scientists rarely have the opportunity to fly through the dusty plasma and directly measure its characteristics in place.

A separate analysis, based on data obtained by the Cassini plasma spectrometer, revealed the presence of nanograins having an electric charge corresponding to a single excess electron. "The Cassini plasma spectrometer has enabled us to discover and analyze new classes of charged particles that were wholly unanticipated when the instrument was designed and built in the 1980s and 90s," said Tom Hill, the study's lead author and a co-investigator based at Rice University in Houston.

The nature of the Enceladus plume has been revealed over time due to the synergistic nature of the fields and particles instruments on Cassini, which has been in residence in Saturn's magnetosphere since 2004. Following the original detection of the plume based on magnetometer measurements, Sven Simon from the University of Cologne, Germany, and Hendrik Kriegel from the University of Braunschweig, Germany, found that the observed perturbation of Saturn's magnetic field required the presence of negatively charged dust grains in the plume. These findings were reported in the April and October 2011 issues of Journal of Geophysical Research Space Physics. Previous data obtained by the ion and neutral mass spectrometer revealed the complex composition of the plume gas, and the cosmic dust analyzer revealed that the plume grains were rich in sodium salts. Because this scenario can only arise if the plume originated from liquid water, it provides compelling evidence for a subsurface ocean.

Cassini will continue to study the complex nature of the plume region in the three planned additional flybys of Enceladus. The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the mission for NASA's Science Mission Directorate, Washington. More Cassini information is at http://www.nasa.gov/cassini and http://saturn.jpl.nasa.gov

Tracing the Milky Way's History

News Release Number: STScI-2012-25 May 30, 2012

Unfortunately, stars don't have birth certificates. So, astronomers have a tough time figuring out their ages. Knowing a star's age is critical for understanding how our Milky Way galaxy built itself up over billions of years from smaller galaxies.

Jason Kalirai of the Space Telescope Science Institute and The Johns Hopkins University's Center for Astrophysical Sciences, both in Baltimore, Md., has found the next best thing to a star's birth certificate. Using a new technique, Kalirai probed the burned-out relics of Sun-like stars, called white dwarfs, in the inner region of our Milky Way galaxy's halo. The halo is a spherical cloud of stars surrounding our galaxy's disk.

Those stars, his study reveals, are 11.5 billion years old, younger than the first generation of Milky Way stars. They formed more than 2 billion years after the birth of the universe 13.7 billion years ago. Previous age estimates, based on analyzing normal stars in the inner halo, ranged from 10 billion to 14 billion years. Kalirai's study reinforces the emerging view that our galaxy's halo is composed of a layer-cake structure that formed in stages over billions of years.

"One of the biggest questions in astronomy is, when did the different parts of the Milky Way form?" Kalirai said. "Sun-like stars live for billions of years and are bright, so they are excellent tracers, offering clues to how our galaxy evolved over time. However, the biggest hindrance we have in inferring galactic formation processes in the Milky Way is our inability to measure accurate ages of Sun-like stars. In this study, I chose a different path: I studied stars at the end of their lives to determine their masses and then connected those masses to the ages of their progenitors. Given the nature of these dead stars, their masses are easier to measure than Sun-like stars."

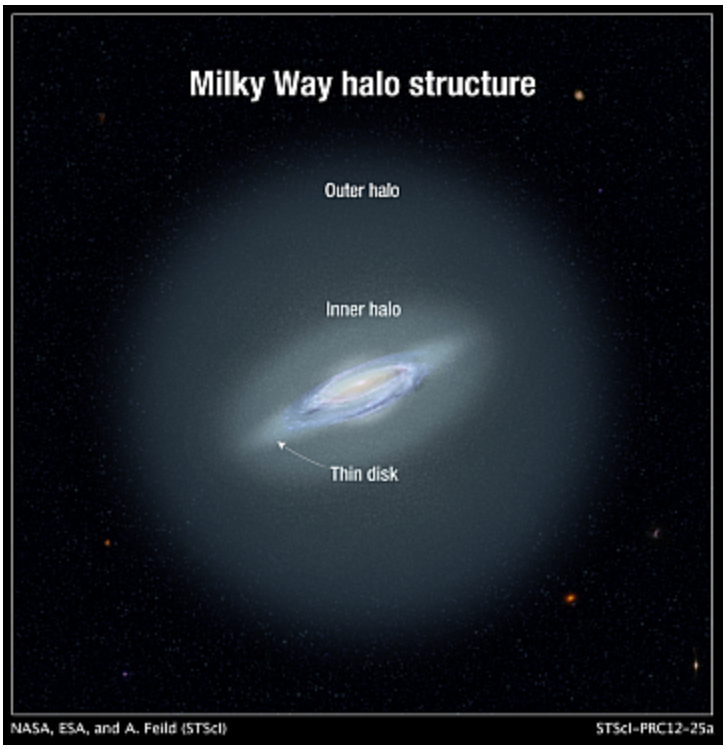
Kalirai targeted white dwarfs in the galaxy's halo because those stars are believed to be among the galaxy's first homesteaders. Some of them are almost as old as the universe itself. These ancient stars provide a fossil record of our Milky Way's infancy, possessing information about our galaxy's birth and growth. "The Milky Way's halo represents the premier hunting ground in which to unravel the archaeology of when and how the galaxy's assembly processes occurred," Kalirai explained.

His results will appear online May 30 in a letter to the journal *Nature*.

White dwarfs divulge their properties so freely because they have a distinct spectral signature. Kalirai analyzed their signatures using archival spectroscopic data from the European Southern Observatory's Very Large Telescope at the Paranal Observatory in Chile. The spectroscopic data are part of the SN Ia Progenitor Survey (SPY), a census of white dwarf stars in the Milky Way. Spectroscopy divides light into its constituent colors, yielding information about a star's characteristics, including its mass and temperature. In his study, Kalirai first analyzed the spectra of several newly minted white dwarfs in the galaxy's inner halo to measure their masses. "The hottest white dwarfs are the descendants of Sun-like stars that have just extinguished their hydrogen fuel," he explained. "The masses of these white dwarfs are proportional to the masses of their progenitors, and we can use that mass to establish the age of the parent stars."

To measure the halo's age, Kalirai compared the masses of the halo stars with those of six newly formed white dwarfs in the ancient globular star cluster M4. Fortunately, the cluster is one of Hubble's favorite targets, and astronomers have a reliable age for when it formed, 12.5 billion years ago. Kalirai found these dead cluster stars in archival visible-light images of nearly 2,000 white dwarfs taken by the Advanced Camera for Surveys aboard NASA's Hubble Space Telescope.

He applied the same techniques that he used on the halo white dwarfs to these cluster white dwarfs. The spectroscopic observations for these stellar remnants came from the W.M. Keck Observatory in Hawaii. His



This illustration shows the Milky Way galaxy's inner and outer halos. A halo is a spherical cloud of stars surrounding a galaxy. Astronomers have proposed that the Milky Way's halo is composed of two populations of stars. The age of the stars in the inner halo, according to measurements by the Paranal Observatory, is 11.5 billion years old. The measurements suggest the inner-halo stars are younger than the outer-halo population, some of which could be 13.5 billion years old. Credit: NASA, ESA, and A. Feild (STScI)

measurements revealed that the halo white dwarfs are heavier than those in M4, indicating the progenitor stars that are evolving into white dwarfs today are also heavier. Therefore, these stars are younger than the M4 stars. More massive stars consume their hydrogen fuel at a faster rate and therefore end their lives more quickly than lighter-weight stars.

Although Kalirai's result is based on a small sample of stars, it does support recent work proposing that the halo is composed of two different populations of stars.

According to the research, the Milky Way's construction schedule began with the oldest globular star clusters and dwarf galaxies, which formed a few hundred million years after the big bang, settling into what is now the galaxy's halo. These populations merged over billions of years to form the structure of our Milky Way. Stars in the inner halo were born during the assembly process. Over time, the Milky Way gobbled up older dwarf galaxies that formed less than 2 billion years after the big bang. Their ancient stars settled into the outskirts of the halo, creating the outer halo.

"In the previous work, the inner population was shown to be different from the outer population in terms of the velocities and chemical abundances of the stars," Kalirai said. "There were no constraints, however, on whether there was an age difference between the two populations. Now, our work suggests an age for the inner halo stars."

"We know some of the remote globular clusters in the outer halo are much older than the inner halo stars, perhaps around 13.5 billion years old," Kalirai contined. "So, our prediction is that if you find white dwarfs in the outer halo, they would have formed from older generations of Sun-like stars. The present day masses of stars in the generation that are now forming white dwarfs would be lower, and therefore the white dwarf masses — which we can measure — will also be lower."

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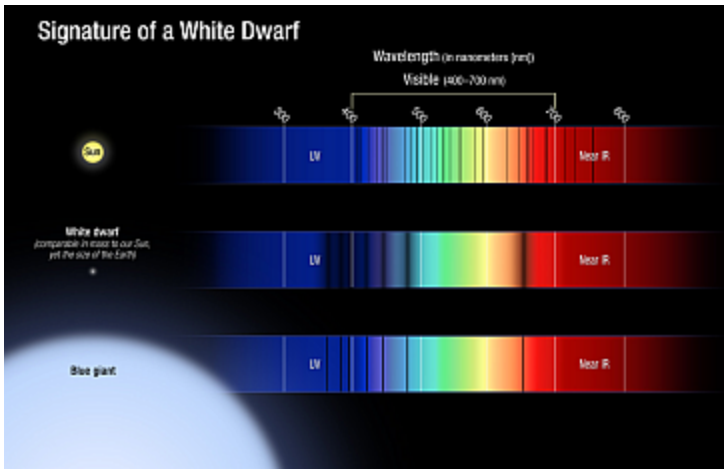
Kalirai hopes to apply his new technique on more halo white dwarfs in his quest to help uncover our galaxy's history.

"One of the interesting questions about the inner halo stars is, did all of them form at the same time, or did they form over a span of time?" Kalirai said. "A sample of 20 to 30 white dwarfs would allow us to see if the inferred ages from the white dwarf masses span from 11 billion to 13 billion years. That could tell us that the accretion events that helped build up the Milky Way kept happening for several billion years, as opposed to all predominantly happening at one epoch."



White dwarf stars have remarkable properties, yet they are very simple. These stripped cores of normal hydrogen-burning stars are about 1 million times denser than matter on Earth. This means that a tablespoon of material from a white dwarf's surface would weigh as much as a school bus on Earth. White dwarfs also have no fuel to generate energy, and most of their atmospheres contain a single atom, hydrogen.

The figure illustrates the spectral features of a white dwarf, in comparison to the Sun and a blue giant. The white dwarf spectrum is simple, containing only absorption lines from the hydrogen atom. But, unlike the same lines in the blue giant spectrum (a bloated star with a low density), the features in the white dwarf are broadened due to the intense pressure on the surface of the star (essentially, the energy levels of the atom are being perturbed). This broadening of the lines, as well as their depth, is directly related to the mass and temperature of the star. Unlike for most stars, astronomers can therefore reliably establish fundamental properties for white dwarfs from their spectra. Credit: NASA, ESA, and A. Feild and J. Kalirai (STScI)

The **Atlanta Astronomy Club, Inc**., the South's largest and oldest astronomical society, meets at **8:00 P.M.** on the 3rd Friday of each month in the Parlor Room - Hitson Center in Sandy Springs, or occasionally at other locations or times. Membership fees are **$30 ($42)** for a family or single person membership. College Students membership fee is **$15 ($27)**. These fees are for a one year membership ($12 per year extra charge to receive a printed *Focal Point* by mail).

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 printed. 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/atlastro.

AAC Officers and Contacts

President: Art Zorka President@AtlantaAstronomy.org

Program Chair: Richard Jakiel Programs@AtlantaAstronomy.org

Observing Chair/BoD Chair: Daniel Herron Observing@AtlantaAstronomy.org

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Treasurer: Sharon Carruthers Treasurer@AtlantaAstronomy.org

Recording Secretary: Pixie Bruner Secretary@AtlantaAstronomy.org

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Board: Brigitte Fessele, Contact info TBA

Board: David Lumpkin, Contact info TBA

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Elliott Outreach Coordinator: Theo Ramakers 770-464-3777 outreach@ceastronomy.org

Georgia Astronomy in State Parks: Sharon Carruthers Treasurer@AtlantaAstronomy.org

PSSG Chairman: Peter Macumber pmacumber@nightsky.org

PSSG Co-Chair: Joanne Cirincione starrynights@AtlantaAstronomy.org

Sidewalk Astronomy: Brad Isley sidewalkastronomy@AtlantaAstronomy.org

Light Tresspass: Open - Contact Mark Banks if you would like to volunteer for this position

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

AAC Webmaster: Daniel Herron, Contact info TBA

Calendar by Tom Faber (Times EDT/EST unless noted)

AAC Events are listed in BOLD

June 4th, Monday: Full Moon. Partial Lunar Eclipse.
June 5th, Tuesday: Transit of Venus starts at about 6:05PM - see pg 4.
June 11th, Monday: Moon Last Quarter.
June 13th, Wednesday: Earliest Sunrise (~6:25AM at Atlanta).
June 14th, Thursday: Lyrid meteors.
June 15th, Friday: **AAC Meeting, 8PM.**
June 16th, Saturday: **CE Chapter Meeting, 5PM. DSO at location TBA.**
June 17th, Sunday: **BoD Meeting at location TBA, 3PM.** Moon near Jupiter.
June 19th, Tuesday: New Moon.
June 20th, Wednesday: Solstice at 7:09PM.
June 21st, Thursday: Moon near Mercury.
June 23rd, Saturday: **GASP at Tugaloo State Park.**
June 26th, Tuesday: Moon First Quarter.
June 27th, Wednesday: Latest Sunset (~8:52PM at Atlanta). Bootids Meteors.
June 29th, Friday: Alignment of Pleiades, Jupiter, Venus, and Aldebaran in morning sky.
July 3rd, Tuesday: Full Moon.
July 10th, Tuesday: Moon Last Quarter.
July 19th, Thursday: New Moon.
July 20th, Friday: **AAC Meeting, 8PM.**
July 21st, Saturday: **CE Chapter Meeting, 5PM. DSO at location TBA.**
July 26th, Thursday: Moon First Quarter.
July 28th, Saturday: Delta Aquarids Meteors.
Aug 1st, Wednesday: Full Moon.

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 . This list is owned by Lenny Abbey.

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 but Word documents or PDF's are okay. You can submit articles anytime up to the deadline. **The deadline for July is Friday, June 22nd. Submissions after the deadline will go in the following month's issue.**

ATLANTA ASTRONOMY CLUB EST. 1947

The Focal Point

Newsletter of The Atlanta Astronomy Club, Inc.

FROM:
Tom Faber
2206 Treeridge Parkway
Alpharetta, GA 30022

We're here to help! Here's how how to reach us:

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Atlanta, GA 30358-1155
www.atlantaastronomy.org
On Twitter at http://twitter.com/atlastro

www.beetagg.com

FIRST CLASS