COMING EVENTS

Public Observing
Sunday August 28
Prairie Park Nature Center
9:00 PM

AAL Club Meeting
Friday, Sept. 16
2001 Malott
7:30 PM

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Report from the Officers: With the summer coming rapidly to a close, contrary to what the temperature may be telling you, the number of astronomical events on the horizon is growing. The last week of August will be busy regionally. In Hutchinson, KS, the Cosmosphere will be holding its annual star party on Saturday August 27th, 2011 from 5 pm – 10:30 pm at the same location as last year, the Hobart-Detter ball field in Carey Park at the south end of Hutchinson. The 3rd annual party will include lots of kids activities during the daylight hours, rocket launches, liquid oxygen ice cream, and star-observing on the ball field after dark. The 2010 event drew over 2000 people. Rick Heschmeyer is organizing the local contingent to travel to Hutch to help out with the event - please contact him if you would like to attend so that he can inform the organizers.

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From the Astronomical League
The Contrainess of Things

Bill Pellerin - Houston Astronomical Society, GuideStar Editor

As observing equipment and imaging systems become more complex the likelihood that something will happen contrary to your expectations increases. I touched on this issue in a previous article about how it is necessary to really learn how our equipment works, in excruciating detail. Many times the problem is not the equipment, it’s our expectations or it’s our lack of knowledge.

The telescope mount that I use requires that several alignment stars be located (by me) as part of the setup process. While the process makes sense, now that I understand it, for a long time it didn’t. It didn’t make sense at first because it was different from other telescope mounts that I had used in the past. I was executing the process in the wrong order – expecting to first tell the mount that I was going to point it to an alignment star instead of moving the mount to the star and then telling the mount that I did.

If you’ve even been to a dog training class, you know that the class is more about training the owner and less about training Fido. That’s often the case with the equipment we use, using it is more about training the owner than making the equipment bend to the will of the owner. You have to get into the head of the equipment designer and understand his or her thinking when the equipment was created.

If you believe the manufacturer’s claim about “easy to set up and use” you’re also likely to believe the medical professional when you’re told that “this won’t hurt a bit”.

The state of the art on astronomical equipment is that this is not the same kind of mass-market product that a television set is. We should not expect the same ease-of-use as we expect of mass-produced appliances. Also, we’re often cobbling together systems by selecting parts from different manufacturers – mounts, telescopes, eye-
One of the biggest star parties in the Midwest, the Heart of America Star Party, takes place at the Astronomical Society of Kansas City’s Dark Sky Site, near Butler, Missouri, about 75 miles south of Kansas City from Aug. 25 - 31, 2011. The remote location offers dark skies and wonderful nighttime viewing. Each year, observing friends from across the country gather to share, to learn, and most of all, to observe. Last years event drew over 140 attendees. For more info, please go to the event web page at http://www.hoasp.org/. Detailed info about registration and costs can be found there.

On a more local scale, we will begin public observing at the Prairie Park Nature Center on the last Sunday in August, Aug. 28. Weather permitting, we will begin setting up around 8:45–9:00 PM. Future tentative dates for the public observing sessions are Sunday Sept. 25, Oct. 30, and Dec. 04, 2011. Our first monthly club meeting is scheduled for Friday, Sept. 16 in 2001 Malott, 7:30 PM. Moreover, our current plan is to hold the Webelo Scout Event on Friday, October 14 this year, a little earlier than usual to avoid the opening of KU basketball season and to make room for a special event being arranged for November. So, mark your calendars.

Any suggestions for improving the club or newsletter are always welcome. Enjoy the summer while it lasts!
NASA's Spitzer Finds Distant Galaxies Grazed on Gas

Galaxies once thought of as voracious tigers are more like grazing cows, according to a new study using NASA's Spitzer Space Telescope.

Astronomers have discovered that galaxies in the distant, early universe continuously ingested their star-making fuel over long periods of time. This goes against previous theories that the galaxies devoured their fuel in quick bursts after run-ins with other galaxies.

"Our study shows the merging of massive galaxies was not the dominant method of galaxy growth in the distant universe," said Ranga-Ram Chary of NASA's Spitzer Science Center at the California Institute of Technology in Pasadena, Calif. "We're finding this type of galactic cannibalism was rare. Instead, we are seeing evidence for a mechanism of galaxy growth in which a typical galaxy fed itself through a steady stream of gas, making stars at a much faster rate than previously thought."

Chary is the principal investigator of the research, appearing in the Aug. 1 issue of the Astrophysical Journal. According to his findings, these grazing galaxies fed steadily over periods of hundreds of millions of years and created an unusual amount of plump stars, up to 100 times the mass of our sun.

"This is the first time that we have identified galaxies that supersized themselves by grazing," said Hyunjin Shim, also of the Spitzer Science Center and lead author of the paper. "They have many more massive stars than our Milky Way galaxy."

Galaxies like our Milky Way are giant collections of stars, gas and dust. They grow in size by feeding off gas and converting it to new stars. A long-standing question in astronomy is: Where did distant galaxies that formed billions of years ago acquire this stellar fuel? The most favored theory was that galaxies grew by merging with other galaxies, feeding off gas stirred up in the collisions.

Chary and his team addressed this question by using Spitzer to survey more than 70 remote galaxies that existed 1 to 2 billion years after the Big Bang (our universe is approximately 13.7 billion years old). To their surprise, these galaxies were blazing with what is called H alpha, which is radiation from hydrogen gas that has been hit with ultraviolet light from stars. High levels of H alpha indicate stars are forming vigorously. Seventy percent of the surveyed galaxies show strong signs of H alpha. By contrast, only 0.1 percent of galaxies in our local universe possess this signature.

Previous studies using ultraviolet-light telescopes found about six times less star formation than Spitzer, which sees infrared light. Scientists think this may be due to large amounts of obscuring dust, through which infrared light can sneak. Spitzer opened a new window onto the galaxies by taking very long-exposure infrared images of a patch of sky called the GOODS fields, for Great Observatories Origins Deep Survey.

Further analyses showed that these galaxies furiously formed stars up to 100 times faster than the current star-formation rate of our Milky Way. What's more, the star formation took place over a long period of time, hundreds of millions of years. This tells astronomers that the galaxies did not grow due to mergers, or collisions, which happen on shorter timescales. While such smash-ups are common in the universe -- for example, our Milky Way will merge with the Andromeda galaxy in about 5 billion years -- the new study shows that large mergers were not the main cause of galaxy growth. Instead, the results show that distant, giant galaxies bulked up by feeding off a steady supply of gas that probably streamed in from filaments of dark matter.

Chary said, "If you could visit a planet in one of these galaxies, the sky would be a crazy place, with tons of bright stars, and fairly frequent supernova explosions."
New GOES-R to Give More Tornado Warning Time
by Dauna Coulter and Dr. Tony Phillips

So far this spring, more than 1,400 tornadoes have struck the U.S. Some of them have cut jaw-dropping trails of destruction across the countryside and, tragically, across inhabited communities, too. Hundreds of lives have been lost in the onslaught. Throughout the season, the National Weather Service has routinely issued tornado alerts. In the case of the Alabama tornadoes of April 27th, forecasters warned of severe weather five full days before the twisters struck. Because they couldn’t say precisely where the twisters would strike, however, many of their warnings went unheeded. “If people get a hurricane warning, they often evacuate the area,” notes NOAA’s Steve Goodman. “But we react differently to tornado warnings.”

Perhaps it’s because tornadoes are smaller than hurricanes, and the odds of a direct hit seem so remote. Recent pictures from Tuscaloosa, Alabama, and Joplin, Missouri, however, show the perils of playing those odds. Goodman believes that more precise warnings could save lives. To fine-tune tornado warnings, NOAA will soon launch the first in a series of next-generation weather satellites – GOES-R (Geostationary Operational Environmental Satellites-R series). The spacecraft is brimming with advanced sensors for measuring key ingredients of severe weather including winds, cloud growth, and lightning.

“GOES-R will be the first geostationary spacecraft to carry a lightning sensor,” says Goodman, the GOES-R Program Senior Scientist. “Studies show that sudden changes in the total lightning activity correlate with storm intensity—and with tornadoes. The lightning mapper will detect and map not only cloud-to-ground lightning, but also bolts within and between clouds. The kind of cloud-to-ground lightning we see from our front yards accounts for only 15-20 percent of total lightning. To get a clear idea of a storm’s intensity, meteorologists need to know about all the lightning—a view GOES-R can provide. All by itself, the lightning mapper will provide 7 minutes more lead time in tornado warnings, according to Goodman. GOES-R’s state-of-the-art instruments will also improve long-range forecasts.

“The satellite’s Advanced Baseline Imager (ABI), for instance, will provide a much clearer picture of clouds,” says NOAA research meteorologist Tim Schmit. Compared to lesser instruments already in orbit, ABI can better detect super-cold “overshooting tops,” evidence of enormous energy and upward velocity that correlate with subsequent severe weather.

“Accurate advanced notice of high-risk tornadoic conditions can cue officials to close schools and businesses even before tornadoes are actually detected,” says Schmit. Forecasters doubt tornadoes can ever be predicted with 100% accuracy. The twisters are just too capricious. GOES-R, however, is a step in the right direction.

Find out more about GOES-R’s unprecedented capabilities at http://www.goes-r.gov. Young people can learn more about tornadoes and all kinds of other weather at http://scijinks.gov. This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.
NASA’s Hubble Discovers Another Moon Around Pluto

Hubble Space Telescope’s keen vision has found yet another moon orbiting the distant, icy dwarf planet Pluto. This discovery expands the size of Pluto’s known satellite system to four moons. The tiny, new satellite — temporarily designated P4 — was uncovered in a Hubble survey searching for rings around the frigid dwarf planet.

The new moon is the smallest moon yet discovered around Pluto. It has an estimated diameter of 8 to 21 miles (13 to 34 km). By comparison, Charon, Pluto’s largest moon, is 746 miles (1,200 km) across, and the other moons, Nix and Hydra are in the range of 20 to 70 miles in diameter (32 to 113 km).

“I find it remarkable that Hubble’s cameras enabled us to see such a tiny object so clearly from a distance of more than 3 billion miles (5 billion km),” said Mark Showalter of the SETI Institute in Mountain View, Calif., who led this observing program with Hubble.

The finding is a result of ongoing work to support NASA’s New Horizons mission, scheduled to fly through the Pluto system in 2015. The mission is designed to provide new insights about worlds at the edge of our solar system. Hubble’s mapping of Pluto’s surface and discovery of its satellites have been invaluable to planning for New Horizons’ close encounter.

“This is a fantastic discovery,” said New Horizons’ principal investigator Alan Stern of the Southwest Research Institute in Boulder, Colo. “Now that we know there’s another moon in the Pluto system, we can plan close-up observations of it during our flyby.” Space Telescope Science Institute director’s discretionary time was allocated to make the Hubble observations.

The new moon is located between the orbits of Nix and Hydra, which Hubble discovered in 2005. Charon was discovered in 1978 at the U.S. Naval Observatory and first resolved using Hubble in 1990 as a separate body from Pluto.

The dwarf planet’s entire moon system is believed to have formed by a collision between Pluto and another planet-sized body early in the history of the solar system. The smashup flung material into orbit around Pluto, which then coalesced into the family of satellites now seen.
A Twisted Star-Forming Web in the Galaxy IC 342

Looking like a spiders web swirled into a spiral, the galaxy IC 342 presents its delicate pattern of dust in this image from NASAs Spitzer Space Telescope. Seen in infrared light, the faint starlight gives way to the glowing bright patterns of dust found throughout the galaxy’s disk.

At a distance of about 10 million light-years, IC 342 is relatively close by galaxy standards, however our vantage point places it directly behind the disk of our own Milky Way. The intervening dust makes it difficult to see in visible light, but infrared light penetrates this veil easily. It belongs to the same group as its even more obscured galaxy neighbor, Maffei 2.

IC 342 is nearly face-on to our view giving a clear, top-down view of the structure of its disk. It has a low surface brightness compared to other spirals, indicating a lower density of stars (seen here in blue). Its dust structures show up much more vividly (yellow-green).

New stars are forming in the disk at a healthy clip. Glowing like gems trapped in the web, regions of heavy star formation appear as yellow-red dots due to the glow of warm dust. The very center glows especially brightly in the infrared, highlighting an enormous burst of star formation occurring in this tiny region. To either side of the center, a small bar of dust and gas is helping to fuel this central star formation.

Data from Spitzers infrared array camera (IRAC) are shown in blue (3.6 and 4.5 microns) and green (5.8 and 8.0 microns) while the multiband imaging photometer (MIPS) observation is red (24 microns).
Neptune Completes Its First Circuit Around The Sun Since Its Discovery

These four images of Neptune were taken by NASA's Hubble Space Telescope during the planet's 16-hour rotation. The snapshots were taken at roughly four-hour intervals, offering a full view of the blue-green planet. Today marks Neptune's first orbit around the Sun since it was discovered nearly 165 years ago. These images were taken to commemorate the event.

The Hubble images, taken with the Wide Field Camera 3 on June 25-26, reveal high-altitude clouds in the northern and southern hemispheres. The clouds are composed of methane ice crystals. In the Hubble images, absorption of red light by methane in Neptune's atmosphere gives the planet its distinctive aqua color. The clouds look pink because they are reflecting near-infrared light. A faint, dark band near the bottom of the southern hemisphere is probably caused by a decrease in the hazes in the atmosphere that scatter blue light. The band was imaged by NASA's Voyager 2 spacecraft in 1989, and may be tied to circumpolar circulation created by high-velocity winds in that region. Neptune is the most distant major planet in our solar system. German astronomer Johann Galle discovered the planet on September 23, 1846. At the time, the discovery doubled the size of the known solar system. The planet is 2.8 billion miles (4.5 billion kilometers) from the Sun, 30 times farther than Earth. Under the Sun's weak pull at that distance, Neptune plods along in its huge orbit, slowly completing one revolution approximately every 165 years.
Process – you leave out a step in your observing process, rendering your results invalid. (Document your process!)

What can you do?

Learn your equipment. Practice using it. Read the manual; it’ll answer a lot of your questions. (I see a lot of questions on online discussion groups that I know are answered in the equipment manual.).

Test things before you try to use them in the field.

Keep equipment in good shape. You take care of it, it’ll take care of you.

Take your time. Nobody is measuring your productivity.

It’s not always a fair fight – you against your equipment – but you can get the upper hand by knowing its peculiarities and learning to work around them. Don’t give up; don’t surrender. If you think that you’re the first astronomer who has had to deal with these problems, you’re wrong.

Magellan Telescope Organization and the Carnegie Observatories (Pasadena). “However, with enough objects it becomes statistically very likely that we will uncover several where the geometries are favorable – we are playing an odds game and it isn’t yet known if Kn 61 will prove to have a companion.” Jacoby also serves as the Principal Investigator for a program to obtain follow-up observations of Kn 61’s central star with Kepler.

To increase their odds, professional and amateur astronomers are working as partners to comb through the entire Kepler field looking for planetary nebula candidates. To date six have been found including this one by Kronberger, a member of the amateur group called the “Deep Sky Hunters.” The group, dedicated to finding new objects in our galaxy and beyond, has found two planetary nebulae in the Kepler field so far (including Kn 61) and a possible third, which, according to Jacoby, “…are extremely rare and each, a valuable gem.”

The detection techniques used by professional and amateurs are similar; in the case of Kn 61 images from the Digital Sky Survey (DSS) provided the data used in the discovery. “Without this close collaboration with amateurs, this discovery would probably not have been made before the end of the Kepler mission. Professionals, using precious telescope time, aren’t as flexible as amateurs who did this using existing data and in their spare time. This was a fantastic pro-am collaboration of discovery,” says Jacoby, who serves as the liaison with the Deep Sky Hunters (DSH) and requested their help to survey the Kepler field. Jacoby published a paper with DSH members in 2010 that describes the techniques used.

“Planetary nebulae present a profound mystery,” says De Marco. “Some recent theories suggest that planetary nebulae form only in close binary or even planetary systems — on the other hand, the conventional textbook explanation is that most stars, even solo stars like our sun, will meet this fate. That might just be too simple.”

However, Jacoby points out that observations from the ground have yet to find a high percentage of binaries associated with planetary nebulae. “This is quite likely due to our inability to detect these binaries from the ground and if so then Kepler is likely to push the debate strongly in one direction or the other.”

Planetary nebulae are common throughout our neighborhood of the galaxy with over 3,000 known and identified. Likely the “end of life” event for stars like our Sun, they form after nuclear fusion can no longer sustain the pressure of gravity in a geriatric star and it becomes unstable, pulsates and throws off a significant shell of gas from its outer layers. This expanding shell is what we see as a planetary nebula when its gas is ionized and glows due to the radiation still emitted by the central star. A key question with planetary nebulae is how companions (stars or even planets) around the central, primary star might impact the complex structures seen in many planetary nebulae. However, to date, a low percentage (about 20%) of these central stars have been found with companions. If this low fraction is due to the fact that the companions are relatively small or distant then current ground-based observations are simply not able to detect the companions — in which case the space-based Kepler telescope will likely be able to fill this observational gap.

“There is no analogy to this behavior on Earth,” says Paul Hartogh, Max-Planck-Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany, who led the collaboration on the analysis of these results. "No significant quantities of water enter our atmosphere from space. This is unique to Saturn."

Although most of the water from Enceladus is lost into space, freezes on the rings or perhaps falls onto Saturn's other moons, the small fraction that does fall into the planet is sufficient to explain the water observed in its upper atmosphere. It is also responsible for the production of additional oxygen-bearing compounds, such as carbon dioxide.
In a partnership between amateur and professional astronomers, the recent discovery of a dying star’s last gasps could help resolve a decades-old debate among astronomers. That is, are stellar companions key to the formation and structure of planetary nebulae?

The discovery, by Austrian amateur astronomer Matthias Kronberger, is featured at an International Astronomical Union symposium on planetary nebulae in Spain’s Canary Islands. The research team’s work features a striking image of the new nebula obtained with the Gemini Observatory.

Not coincidently, the location of the new nebula (named Kronberger 61, or Kn 61, after its discoverer) is within a relatively small patch of sky being intensely monitored by NASA’s Kepler planet finding mission. Kepler’s goal is to determine the frequency of Earth-sized planets around Sun-like stars. In the process, the effects of other close stellar and/or planetary companions are detectable.

“Kn 61 is among a rather small collection of planetary nebulae that are strategically placed within Kepler’s gaze,” said Orsola De Marco of Macquarie University in Sydney, Australia who is the author of a 2009 paper speculating on how companion stars or even planets may influence and shape the intricate structure seen in many planetary nebulae. “Explaining the puffs left behind when medium sized stars like our Sun expel their last-breaths is a source of heated debate among astronomers, especially the part that companions might play,” says De Marco, “it literally keeps us up at night!”

NASA’s Kepler Mission monitors a 105 square degree portion of the sky near the northern constellation of Cygnus the Swan. Kepler’s field-of-view is comparable to the area of your hand held at arm’s length. The spacecraft continuously stares at more than 150,000 stars in the same patch of sky observing the changes in brightness. The presence of a companion can cause these brightness fluctuations through eclipses or tidal disruptions. However, most commonly in such binaries, the total amount of light received changes due to reflections from, and heating of, the companion by the star – analogous to the Moon’s phases. “It is a gamble that possible companions, or even planets, can be found due to these usually small light variations,” says George Jacoby of the Giant
Enceladus Rains Water Onto Saturn

ESA’s Herschel space observatory has shown that water expelled from the moon Enceladus forms a giant torus of water vapor around Saturn. The discovery solves a 14-year mystery by identifying the source of the water in Saturn’s upper atmosphere. Herschel’s latest results mean that Enceladus is the only moon in the Solar System known to influence the chemical composition of its parent planet.

Enceladus expels around 250 kg of water vapor every second, through a collection of jets from the south polar region known as the Tiger Stripes because of their distinctive surface markings. These crucial observations reveal that the water creates a doughnut-shaped torus of vapor surrounding the ringed planet. The total width of the torus is more than 10 times the radius of Saturn, yet it is only about one Saturn radius thick. Enceladus orbits the planet at a distance of about four Saturn radii, replenishing the torus with its jets of water.

Despite its enormous size, it has escaped detection until now because water vapor is transparent to visible light but not at the infrared wavelengths Herschel was designed to see. Saturn’s atmosphere is known to contain traces of gaseous water in its deeper layers. A particular enigma has been the presence of water in its upper atmosphere.

First reported in 1997 by teams using ESA’s Infrared Space Observatory, the source of this water was unknown until now. Computer models of these latest Herschel observations show that about 3-5% of the water expelled by Enceladus ends up falling into Saturn.

(Continued on page 8)