



# The IAS News & Views

Volume 80, Issue 5

[www.iasindy.org](http://www.iasindy.org)

**Indiana Astronomical Society/Link Observatory Public Lecture**  
**May 4, 2013**  
**8:00 PM**  
**Goethe Link Observatory**  
**Adventures in Science: Building a 30-meter Telescope**

Dr. Catherine Pilachowski

The Thirty Meter Telescope Project is a collaboration of Canada, Caltech, China, India, Japan, the University of California, and Yale University to build a 30-m, segmented-mirror telescope on the Big Island of Hawaii. The project hopes to start construction on Mauna Kea in 2014, and to complete the telescope by 2022. The telescope is designed to answer such questions as what is the nature and composition of the universe, when did galaxies form and how did they evolve, what is the relationship between black holes and galaxies, how do stars and planets form, what is the nature of extra-solar planets, and is there life elsewhere? To answer these questions will require the light-gathering power of a 30-meter telescope plus extraordinary angular resolution. The project's goal is to achieve, with adaptive optics, angular resolution of 0.015 arc seconds over a 30 arc second field of view

Caty Pilachowski has held the Daniel Kirkwood Chair in Astronomy at Indiana University, Bloomington, since 2001. In her research, she studies the chemical compositions of stars and the chemical evolution of star systems, concentrating mostly on star clusters. She has also been active in the areas of light pollution, astronomical instrumentation, large telescope design and construction, electronic publications, women in science, and diversity. Before coming to IU, she served on the scientific staff of the Kitt Peak National Observatory in Arizona and as Project Scientist for the WIYN 3.5-m telescope, which she now uses for her research.

## **IAS NEWS**

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### **Social Media for the IAS**

#### **Yahoo Group: IAS-Indy Indiana Astronomical Society**

Did you know that our main sources of communication within the Society are the Facebook page and Yahoo group. If we cancel meetings or events, the notice goes out on the Facebook page and Yahoo group. If we add an event at the last second, a notice goes out on the Facebook page and Yahoo group.

The Facebook page is open to anyone. Members do not have to be a member of the IAS. The Yahoo group is a closed group for "members only" that is monitored for spam and misuse.

Did you also know that about a third of our members don't sign up for the Yahoo group? I personally don't understand it. Some do have security concerns with Yahoo.

When you join the Society, you are sent an invitation to join the Yahoo group. Then when you get an email from Yahoo with the invitation, you, need to accept it by following the directions of the email. You also have to have a Yahoo ID. If you are a member of the IAS and want to join the group, send me an email at [kb9srb@comcast.net](mailto:kb9srb@comcast.net) and I will send you an invitation.

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### **American Astronomical Society will meet in Indy**

American Astronomical Society will meet in Indy the first week of June, 2013. There will likely be sessions of interest to IAS members, and I think everyone will enjoy the exhibit hall. Registration is pretty pricey, though they usually have special arrangements for teachers and workshop attendees. Members of the press are also welcome.

Apparently, if you volunteer to help at the convention, you can get in free. Contact the coordinator to volunteer at:

<http://aas.org/meetings/aas222/volunteer>

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## **Recent Events for the IAS**

### **McCloud Monthly Star Gaze**

I got to the park and met Betsy and Doug. Doug and I checked out the observing field. The torrential rains we've recently gotten hadn't made the ground too wet fortunately. Nevertheless we decided to set up on the mounds to minimize any ground fog. Here's the list of attendees. I apologize in advance if I missed anyone:

Bill Conner who brought chocolate chip cookies and Fig "Newtonians!"

Doug and Betsy Brown

Jon Renshaw and his son Joshua. Jon is a new member who was working on the Novice Observing List. Joshua, who is eight, has his own 4.5" DOB and handled it like a pro.

Tom Hubbard and his son Steve

Dave Williams

James Lamb, who just joined us this month. Welcome James.

We also had a new member who recently moved here from Chicago named Rick but, Rick, I apologize because I didn't get your last name.

## IAS News and Views

We had a small crowd; a family plus a few individuals. I didn't bother with the Power Point presentation; we just kept it casual. Here are some of the objects that I remember observing:

Jupiter, Saturn, & the Moon

M44 - The Beehive Cluster

M53 - Globular (A Lyrid meteor shot across my eyepiece as I was observing this.)

M3 - Globular

Castor A & B

NGC 2264 - The Cone Nebula

M51 - The Whirlpool Galaxy

M81 & M82 - The Cigar Galaxy. In addition we were able to spot NGC 3307 with Rick's help.

We couldn't go near the Leo and Virgo clusters due to the waxing moon. This was somewhat tragic because the seeing was so good otherwise!

We also said farewell to M42 for the season. We saw the Trapezium and some faint nebulosity but it was getting lost in the twilight.

I know this isn't everything that was observed last night so, please anyone, add your comments on anything you observed.

As we were packing up to leave a Hendricks County Sherriff's Deputy pulled up. He got out and we let him look through the scopes. He saw the moon, Saturn, and Jupiter before it set. He gave us plenty of "Wows" and "Cools" which was good to hear. I think he was just checking everything out. He took off and so did we. Thanks again, everyone, for coming out. It was a small crowd but a great evening of fellowship.

Tom Hubbard brought Starburst fruit chews. Between those, Bill's Fig Newtonians, and Steve McSpadden Milky Way's, we've got quite junk food smorgasbord!

Mike Newberg

## **Joint IAS/WVAS Observing Event April 12-14**

**Well we got a wash out at Prairie Grass. The ground would not have held telescopes. Maybe next year.**

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## **Upcoming Public Events**

### **IAS/Holcomb Observatory Program Planning Meeting--7:00 PM, April 30, 2013**

The IAS Board Meeting is being held at Holcomb Observatory on the Butler Campus at 7:00PM. Should you have an issue that you would the Board to address, please contact Bill Conner via the webpage [iasindy.org](http://iasindy.org) under the contact us section.

### **IAS/Link Observatory General Meeting and Public Lecture – MAY 4 8:00 PM**

The IAS/Link Observatory general meeting and public lecture May 4 at 8:00PM at the Goethe Link Observatory

### **McCloud Monthly Star Gaze May18, 2013 8:30PM.**

## LOSSC Public Event May 25

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### NEW ASTRONOMERS GROUP

May 4, 2013

**The formal NAG event has been cancelled.**

We still plan to have a workshop outside after the general meeting, weather permitting. If you are a novice and need some help, come out and hopefully our more experienced observers can be of help

Bruce needs help. He has developed several titles for NAG but he does not plan to present every month. Please contact him if you can help.

### Observing Activities

#### Activities for May:

##### Link Observatory -

First Link Campout May 10-11. Gates open 6:00 PM Friday.

Impromptu observing as sky conditions allow. Check Yahoo site for information.

##### McCloud Activities—

McCloud Monthly Star Gaze May 18

Impromptu observing as sky conditions allow. Check Yahoo site for information.

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#### Dark Sky Observing Site Information

We are able to go to the Link, Prairie Grass Observatories, and McCloud Nature Park at non scheduled times if they do not conflict with reserved activities:

The Link Observatory is open for observing during IAS functions held there from early Spring to late Fall. See our calendar of events on the website [www.iasindy.org](http://www.iasindy.org). Observing opportunities at non scheduled times are announced on the IAS Yahoo group and are generally scheduled by our telescope operators as weather permits.

For those interested in going to McCloud to observe, please call the park office 765 676 5437 before 4PM on the day you want to go out. They will give you permission to be there at night and make arrangements to cut off the lights.

For those interested in going to Prairie Grass Observatory for observing call Hoppe at 1-765-296-2753.

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#### The May Deep-Sky Challenge

Below please find a list of ten (10) objects to view this month. Those who complete the primary objects will receive a certificate via email and be recognized in the News and Views. We're also providing a challenge object to help push the limits of your observing skills. It's not necessary to successfully view the challenge object to receive the certificate; we only ask that you try.

Please complete the following list to receive the May certificate:

## IAS News and Views

M98 (edge-on spiral in Coma Berenices)  
M99 (three-armed spiral in Coma Berenices)  
M100 (lovely face-on spiral in Coma Berenices)  
M84 (elliptical galaxy in Virgo)  
M86 (elliptical galaxy in Virgo)  
NGC4435 (compact lenticular galaxy in Virgo)  
NGC4438 (distorted spiral in Virgo)  
NGC4526 (a spiral flanked by bright stars)  
M51 ("Whirlpool Galaxy" in Canes Venatici)  
NGC5195 (satellite of M51)

Challenge object for May 2013: NGC4236 in Draco

The above objects are located between 12 and 14 hours of right ascension and so are well-placed for evening viewing this month.

In May, hundreds of galaxies are available for viewing in Virgo, Coma Berenices and Canes Venatici. However, bright stars are uncommon; and it's often easier to galaxy-hop than it is to star-hop. A good place to start is Denebola, at the tail of Leo the lion. Pan east about 7 degrees and center a pair of 5th-magnitude stars in your finder. Backtrack west about 30' and you should land on M98, an edge-on spiral elongated east-west. At magnitude 10.4 this galaxy should be easily detected in an 8-inch. M99 is located about 1-1/2 degrees to the east-southeast of M98. You may be able to detect some blotchy patches in this three-armed spiral -- these are HII regions, places where new stars are forming. Returning to your finder, follow a trail of three stars about 3 degrees to the northeast and you should land on M100. Brighter than 10th magnitude and 7' in diameter, many beautiful amateur photographs have been taken of this symmetrical, face-on spiral.

From M100, pan your scope about 3-1/2 degrees south and about half a degree east. You should land on a pair of nearly identical, bright patches of light separated by less than 20'. These are M84 and M86; giant elliptical galaxies that constitute the heart of the Virgo Cluster. Recent observations of M84 show a jet of gas and rapidly moving stars, suggestive of a supermassive black hole in its center. M86, in turn, displays the highest blueshift of all the Messier objects. Less than half a degree to the east-northeast can be found NGC4435, a compact patch of magnitude 10.9. This spindle galaxy is elongated roughly north-south in a 2:1 ratio. The 10th-magnitude spiral galaxy NGC4438 lies only 6' to the south. Deep images show starburst formation and tidal streams caused by gravitational interactions between these neighbors in space. Those having larger apertures will encounter many other galaxies in the immediate vicinity, which along with NGCs 4435 and 4438 form a stream curving toward the northeast. Take a star chart with you and try to detect NGCs 4388, 4413, 4425, 4461, 4473 and 4477. This collection of galaxies is popularly known as "Markarian's Chain."

About 10 degrees further south in Virgo is a pair of 7th-magnitude stars that are only 15' apart. Between the two, at RA 12:34 Dec +07:42, lies NGC4526. I stumbled across this barred spiral quite by accident back in 1987 while working on a Messier program. The event has been embedded in my memory ever since, mainly because of the flanking bright stars. It was one of the first non-Messier galaxies I had ever seen. Look for an 11th-magnitude patch, elongated in position angle 120. Moving one or more of the stars out of the field might help you detect the [relatively] feeble light of this galaxy.

Messier 51, the Whirlpool Galaxy, can be located about four degrees southwest of Alkaid (the last star in the handle of the Big Dipper). This was the galaxy in which spiral structure was first described -- by

## IAS News and Views

Lord Rosse using his 72" Leviathan reflector. Amateurs today may detect hints of the same structure using telescopes of 12" aperture or larger. The irregular galaxy NGC5195 should present no difficulties, lying in the same field as M51. These two galaxies display mutual gravitational distortions. Our challenge object NGC4236 lies much further north among the faint stars of Draco. Also known as Caldwell 3, this spiral is magnitude 10.5 but has little central condensation and is nearly 20' across. Low powers and crystal-clear skies on a moonless night will likely be necessary to detect it.

If you complete this list prior to the end of May, contact Bruce Bowman to ensure you receive recognition. At this time only IAS members are eligible.

Nobody completed the March challenge. Observing opportunities were scarce due to bad weather. We'll recycle the same collection of objects for viewing in early 2014.

## FAQs ABOUT THE IAS DEEP-SKY CHALLENGE

Q: Do I have to use my own equipment?

A: No...Although bringing and using your own telescope is strongly encouraged. Also keep in mind that the IAS has an equipment loan program.

Q: Do I need to find the objects myself?

A: No. You need only make the observations. Conceptually, if we had 10 telescopes set up at a star party -- each trained on a different object -- you could just go from one to the other and become eligible.

Q: What do I need to submit to you to receive the award?

A: Just contact me and let me know that you completed the requirements for the month. Your certificate will be emailed to you as a PDF file.

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## May Novice/Urban Observing Challenge

Mel 111, the "Coma Star Cluster", Open Cluster in Coma Berenices, 12h 25.0m, +26° 00', mag = 1.8, size = 275'

24 Comae Berenices, Double Star in Coma Berenices, 12h 35.1m, +18° 23', mag = 5.2, 6.7, sep = 20.3"

32 Camelopardalis, Double Star in Camelopardalis, 12h 49.2m, +83° 25', mag = 5.3, 5.8, sep = 21.6"

M94, Spiral Galaxy in Canes Venatici, 12h 50.9m, +41° 07', mag = 8.1, size = 11' x 9.1'

Alpha Canum Venaticorum, "Cor Caroli", Double Star in Canes Venatici, 12h 56.0m, +38° 19', mag = 2.9, 5.5, sep = 19.4"

M64, the "Black-Eye Galaxy", Spiral Galaxy in Coma Berenices, 12h 56.7m, +21° 41', mag = 8.5, size = 9.3' x 5.4'

## IAS News and Views

Zeta and 80 Ursa Majoris, “Mizar” and “Alcor”, Double Stars in Ursa Major, 13h 23.9m, +54° 56', 2.3, 4.0, 4.0, sep = 14.4", 709"

M3, Globular Cluster in Canes Venatici, 13h 42.2m, +28° 23', mag = 5.9, size = 16.0'

plus 2 Lunar objects –  
Mare Serenitatis, first quarter moon  
Tyco, last quarter moon

### Challenge Object:

M104, the “Sombrero Galaxy”, Spiral Galaxy in Virgo, 12h 40.0m, -11° 37', mag = 8.3, 8.9' x 4.1'

### Notes:

To qualify for the Novice/Urban Observing List, you must observe at least 6 of the objects. Members are encouraged to find these objects without the use of GoTo so that they become more familiar with the night sky.

If you successfully observe at least 6 of the objects, please contact Phil Dimpelfeld ([philip.dimpelfeld@yahoo.com](mailto:philip.dimpelfeld@yahoo.com)). Let Phil know how many of the objects you were able to observe. You will be e-mailed a certificate recognizing your accomplishment.

The Novice/Urban Observing List will include objects on the Moon. Users should look for a map of the moon to use to identify future features. The "Sky & Telescope Field Map of the Moon" is a good investment ([shopatsky.com](http://shopatsky.com)).

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## **Al/Cor Observations**

### **By Chris Cordell**

## **Galileo Program**

### Introduction

Welcome to the Astronomical League's Galileo Program. The purpose of this observing program is to experience the thrill that Galileo had when he was the first person to turn a telescope towards the sky. You will make observations like those that caused such a great uproar throughout Europe as you find evidence that shows that the Ptolemaic model of the Universe (geocentric) was wrong and that Copernicus might be right (heliocentric), and that Aristotle may not have been right either...

At the time of Galileo, the Universe was generally believed to be as Aristotle and Ptolemy envisioned it. The Earth was the center and everything revolved around us. Copernicus had proposed the idea that the planets all orbit the sun about 100 years earlier, but his solution was inaccurate when predicting the future behaviors of the planets. Aristotle's premise was that the heavens were made of a fifth, “divine element” and that: “The universe is uncompounded, ungenerated, eternal, unalterable, and neither heavy nor light.” This implies that things are perfect in space (the moon and beyond). So objects are spheres and travel in circles. They are flawless and have no detailed features.

Picture yourself as Galileo Galilei. It is the turn of the century; the 17th century! It is the early 1600's and you are a scientist and mathematician. You see your role to help determine how the universe works. You are not happy with the scientific philosophers who use logic to prove their theories. You believe in experimentation and observation, and you have a brand new tool, a telescope (which incidentally you made yourself). It is June of 1609 and it is only 3-power, but you quickly follow that with one of 8-power and then another with 20-power in October. So much to see, that nobody has seen before.

## IAS News and Views

### Rules and Regulations

All observations must be done at a magnification between 10 and 20. Either binoculars or a telescope may be used. The instrument should be mounted to provide adequate stability. Go-to equipment is allowed.

You must complete all of the requirements except those that are labeled “Optional”. The optional ones should be done if you are able, but by their nature it is expected that many observers may not be able to do them.

To earn this certification, you must be a member of the Astronomical League.

You should document the requirement number, the date and time of your observation, the equipment used and its magnification, and indicate the seeing and transparency.

Repeat Galileo’s Observations of the heavens. The following are brief descriptions. I recommend that you download the full details from the Astronomical League website [here](#) so that you will know the purpose of each of the following observations and see examples of Galileo’s work:

1. Supernova (optional): Observe a naked-eye supernova in the Milky Way galaxy. Make a sketch of the sky during the supernova and one after the supernova has faded below the level of visibility. Estimate its maximum brightness. Last one 1609.
2. The Moon: Observe and sketch the moon. It may be done at any phase where enough detail can be seen to show that there are mountains and valleys on the moon.
3. Jupiter’s Moons: Observe and sketch Jupiter and its moon daily through at least one cycle of their orbits. This will be a minimum of 17 days. From these sketches, note the dates and times of their greatest distance from Jupiter, and calculate the orbital periods of the four Galilean moons: Io, Europa, Ganymede, and Callisto.
4. Jupiter’s moons in eclipse: Observe and sketch, noting the timing, one of Jupiter’s moons during an ingress or egress with Jupiter’s shadow. Callisto or Ganymede is the most dramatic. Two observations should be done. One close to opposition and the second when Jupiter is at quadrature (90degrees from the Sun). Note how close to the planet the moon is when the events occur.
5. Orion’s Head Nebula: Observe and sketch the region at the head of Orion (the star is named Meissa or lambda Orionis). You will note that what looks like 1 star naked eye is actually 3 bright stars and many lesser ones. Sketch what you see.
6. Praesepe Nebula: Observe and sketch the area of M44 in Cancer.
7. Pleiades Nebula: Observe and sketch the area of M45 in Taurus.
8. Saturn’s Ears: Observe and sketch Saturn. The sketch should show that the image of Saturn does not appear as a perfect sphere but has “ears” at 20 power. This may be a challenge this year as the rings are near edge-on.
9. Venus phases: Observe and sketch Venus monthly, through at least a half cycle of phases. Do this from the time it first appears in the morning or evening sky until the last time it is visible. Calculate the length of the cycle and be sure to capture the relative size at each observation.
10. Sunspots: Observe one large spot that completes one rotation of the sun. Full-face sketches should be made about once per week. Sunspots measured should be fairly close to the solar equator and measurements should be done from meridian crossing to meridian crossing. What is the rotational period for the sun near its equator? This one will be challenging during this low sunspot year.
11. Comets: Make at least three observations of a comet and plot its progress among the stars.
12. Neptune: Observe Neptune and sketch what you see in your field of view.
13. Aurora: (Optional) Observe and sketch either the Aurora Borealis or the Aurora Australis.

This program has a pin and certificate for those who successfully complete all of the required activities. Once you have made the necessary observations and sketches, mail the **copies** of your logs to the Program Coordinator, along with your name, address, astronomy club or Astronomical League affiliation, e-mail, and phone number. Please do not send your original logs, as they will not be returned. Upon verification of your observations, your certificate and pin may be forwarded either to you or the Indiana Astronomical Society Awards Coordinator, for presentation, as you so choose.

For Observing Manual and Object List details, access: [www.astroleague.org](http://www.astroleague.org), click on the "Observe" tab at the top of the home page, and select "Clubs by Experience Level". The Galileo Program is listed in the Beginner section.

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## **IU Kirkwood Observatory Bloomington**

The Kirkwood Observatory Solar Telescope is open on the "First Saturday" of each month from 1-3 PM. Viewers may even be able to see a solar prominence or two, weather permitting. Updated weather conditions and closings will be posted at the Kirkwood Observatory Hotline at (812) 855-7736, and at the Observatory webpage, <http://www.astro.indiana.edu/kirkwood.shtml>.

Monthly openings of the solar telescope are planned for the first Saturday of each month during our 2013 observing seasons. And if you want to follow the Sun in between our monthly Solar Telescope openings, the website [www.spaceweather.com](http://www.spaceweather.com) provides daily updates.

Kirkwood Observatory on the IU campus is open each Wednesday evening [from Spring Break until mid-November](#), weather permitting! Join us for a night of observing the night sky with the Kirkwood 12" refractor. Please visit our schedule at <http://www.astro.indiana.edu/kirkwood.shtml>, for a list of dates and times. For updated weather conditions and closings, please call the Kirkwood Observatory Hotline at (812) 855-7736.

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## **NASA Space Place**

### **Exploring the Water World**

In some ways, we know more about Mars, Venus and the Moon than we know about Earth. That's because 70% of our solar system's watery blue planet is hidden under its ocean. The ocean contains about 98% of all the water on Earth. In total volume, it makes up more than 99% of the space inhabited by living creatures on the planet.

As dominant a feature as it is, the ocean—at least below a few tens of meters deep—is an alien world most of us seldom contemplate. But perhaps we should.

The ocean stores heat like a "fly wheel" for climate. Its huge capacity as a heat and water reservoir moderates the climate of Earth. Within this Earth system, both the physical and biological processes of the ocean play a key role in the water cycle, the carbon cycle, and climate variability.

This great reservoir continuously exchanges heat, moisture, and carbon with the atmosphere, driving our weather patterns and influencing the slow, subtle changes in our climate.

The study of Earth and its ocean is a big part of NASA's mission. Before satellites, the information we had about the ocean was pretty much "hit or miss," with the only data collectors being ships, buoys, and instruments set adrift on the waves.

## IAS News and Views

Now ocean-observing satellites measure surface topography, currents, waves, and winds. They monitor the health of phytoplankton, which live in the surface layer of the ocean and supply half the oxygen in the atmosphere. Satellites monitor the extent of Arctic sea ice so we can compare this important parameter with that of past years. Satellites also measure rainfall, the amount of sunlight reaching the sea, the temperature of the ocean's surface, and even its salinity!

Using remote sensing data and computer models, scientists can now investigate how the oceans affect the evolution of weather, hurricanes, and climate. In just a few months, one satellite can collect more information about the ocean than all the ships and buoys in the world have collected over the past 100 years!

NASA's Earth Science Division has launched many missions to planet Earth. These satellites and other studies all help us understand how the atmosphere, the ocean, the land and life—including humans—all interact together.

Find out more about NASA's ocean studies at <http://science.nasa.gov/earth-science/oceanography>. Kids will have fun exploring our planet at The Space Place, <http://spaceplace.nasa.gov/earth>.

*This article was written by Diane K. Fisher and provided through the courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*



*This image from September 2012, shows that the Arctic sea ice is the smallest recorded since record keeping began in 1979. This image is from NASA's Scientific Visualization Studio at Goddard Space Flight Center.*

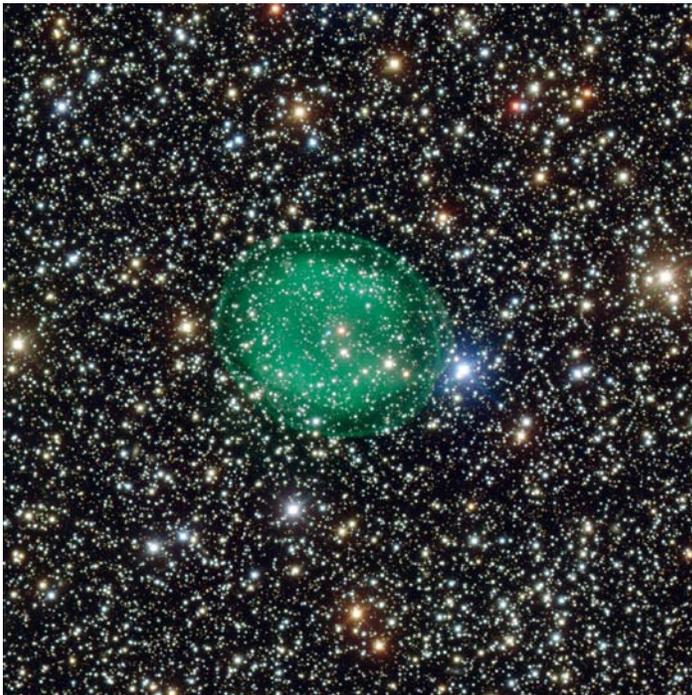
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## AAVSO Writer's Bureau

### [The End of Sun-like Stars](#)

#### Planetary Nebulae

Several times a year I go out and give public talks about astronomy and one of the questions I get a lot is, "What will happen to the Sun?" Sometimes people have this idea that the Sun will blow up in a huge explosion and overtake Earth. Others worry about something hitting the Sun and causing it to do something. Actually, things DO hit the Sun— comets do this, for example. But so far, none has made a difference in how the Sun behaves.



This intriguing new picture from ESO's Very Large Telescope shows the glowing green planetary nebula IC 1295 surrounding a dim and dying star located about 3300 light-years away in the constellation of Scutum (The Shield). This is the most detailed picture of this object ever taken.

What DOES make a difference in how the Sun (and other stars) acts are age and mass. Stars with masses ranging from one solar mass to about 8 solar masses have fairly quiet deaths — that is, they don't blow up in titanic explosions so much as they just "puff out" their outer atmospheres to space and then fade away.

The Sun is the one we care the most about. It is about 4.6 billion years old and it will likely live another four billion years before it starts to age and die. That aging process is of great interest to astronomers and so they study other stars as they die to see how the Sun will do it. The Sun and stars

## IAS News and Views

like it (similar in mass and luminosity) shine for billions of years before they hit retirement age and start to swell up.

As they do this, their atmospheres get “huffed off” by a stellar wind similar to our solar wind. It’s almost as if the star is gently sneezing its outer layers to space. This takes a while — and all that material eventually ends up in a cloud of gas and dust that surrounds the cloud. That cloud (with the dying star at the center) is what’s called a “planetary nebula”. The name was bestowed by William Herschel, who thought they looked similar to a distant gas giant planet. There’s nothing planetary about these things — they’re really stars like the Sun moving through an important step in the aging and death process.

Planetary nebulae come in many different shapes. This image comes from the [European Southern Observatory’s Very Large Telescope](#). It’s of a nebula called IC 1295, and since the image is such high resolution, you can actually make out multiple shells of material surrounding the dying star. This implies the atmosphere blew out in episodes as the star’s faltering core emitted sudden bursts of energy.

The gas surrounding the dying star (which is the small blue-white spot in the heart of the nebula next to a reddish spot) is bathed in strong ultraviolet radiation from the aging star, which makes the gas glow. Different chemical elements glow with different colors, and the green color you see here comes from ionized oxygen (that is, oxygen gas heated by radiation from the central star and is now emitting greenish light).

This cloud won’t last forever. In a few tens of thousands of years, the clouds will slowly dissipate. Eventually only the remains of the star will be left behind as a white dwarf. It will continue to shrink a bit longer, but eventually that will stop and the white dwarf will continue to cool for billions of years. I read somewhere that in the entire history of the universe, not one white dwarf has yet cooled to completion. There hasn’t been time in the 13.8-billion-year age of the cosmos for them do that.

So, that’s the fate of the Sun in general. It won’t blow up as a supernova (because it doesn’t have the mass to do so). It will gently (for a star) sigh its life away. Hopefully by that time, humanity will have found other worlds to live on.

C. C. Petersen, [The Spacewriter's Ramblings](http://thespacewriter.com/wp/) <http://thespacewriter.com/wp/>

Content distributed by AAVSO Writer’s Bureau

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## Do You Have a Question or Need?

We have established a list of members who would be willing to receive calls for help on specific objects. If you have a specific skill and would be willing to help others please contact Jeff Patterson [KB9SRB@hotmail.com](mailto:KB9SRB@hotmail.com).

William Conner ([wmtconner@att.net](mailto:wmtconner@att.net)) - for CCD imaging and remotely controlled observatories.  
Jeff Patterson (Contact Jeff via the webpage [iasindy.org](http://iasindy.org) under the contact us section) – Observatory design and construction

Brian Murphy ([bmurphy@monumentcompanies.com](mailto:bmurphy@monumentcompanies.com)) - "telescope construction and collimation".

IAS News and Views

Eric Allen (ericandroberta@sbcglobal.net) - Telescope making and mirror grinding  
Fritz Kleinhans ([starman@iupui.edu](mailto:starman@iupui.edu)) Color CCD and DSL Camera astrophotography

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## **Public Outreach Programs – To schedule a program at the Link Observatory or at your site, please contact the following people:**

**Public Outreach Programs:** To schedule a public event contact Gerald Venne via our webpage at: [www.iasindy.org](http://www.iasindy.org). Place your cursor on the “Home” tab and select “Contact Us” on the pull down menu. You will find a link to Gerald’s email

To schedule the Goethe Link Observatory, contact John Shepherd via the webpage [www.iasindy.org](http://www.iasindy.org). Place your cursor on the “Home” tab and select “Contact Us” on the pull down menu. You will find a link to John’s email

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## **Astro Ads**

Are you changing or upgrading your equipment? Do you have or are you looking for astronomical materials and equipment? The Indiana Astronomical Society as a service to its members, will publish non-commercial ads at no charge. The ad will stay in the Newsletter for 4 months and may be renewed at the owner’s request.

### **To place an ad, contact:**

Newsletter Editor  
Jeff Patterson  
1780 S. Morgantown Rd.  
Greenwood, IN 46143  
(317) 300-0449  
E-Mail: [KB9SRB@Hotmail.com](mailto:KB9SRB@Hotmail.com)

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## **Equipment Loan Program**

The Loan Program has been helpful to those new to the hobby and others in need of observing equipment.

Did you know you could borrow a scope or piece of astronomy equipment from the Society and take it for a test drive? The Society has a program where members who are trying to determine what kind of equipment to buy can borrow one of the Society’s scopes for a month or two and see how they like it. Philip Dimpelfeld is the chairman of the program and can arrange for your pickup and training on the use of the particular instrument. This is a great way to see what telescope you want to purchase. We have several scopes, eyepieces and binoculars to loan.

We will consider donations of equipment that you feel to this program and you no longer need. Philip Dimpelfeld at [equipment@iasindy.org](mailto:equipment@iasindy.org)

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### 2013 Calendar of Monthly Meetings

Month	Board	General	NAG	McCloud
January	8	12	12	
February	5	9	9	
March	5	9	9	
April	2	6	6	20
May	28	June 1	June 1	18
June	25	29	1	15
July	23	27	27	13
August	27	31	31	17
September	24	28	28	14
October	22	26	26	12
November	19	23	23	
December	None	TBA		

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### Membership Status Report

The following is the April 2013 status of membership as of 4/22/13:

Total Membership: 157

Renewals: 3

New Members: 2

Lee Fawkes - Indianapolis, IN  
Rob Mountain - Indianapolis, IN

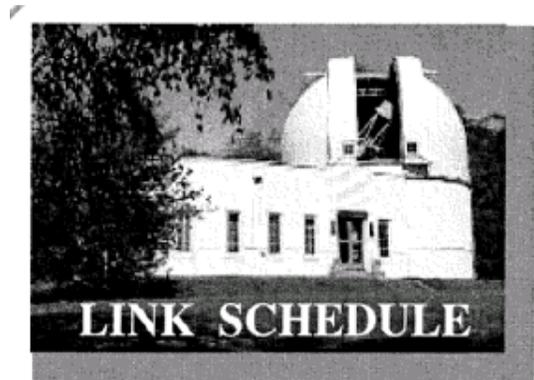
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### Goethe Link Observatory

#### Observatory Address

Goethe Link Observatory  
8403 N. Observatory Lane  
Martinsville, IN 46151

Latitude: 39 degrees, 33 minutes north  
Longitude: 86 degrees, 24 minutes west  
Phone: (317) 831-0668



This schedule is being published to assure proper access to the Link Observatory for programs that are designed as observational, general education, astronomy conferences, or amateur research projects. Training programs are tentatively scheduled for Saturday evenings only. Although other requests can over-ride these sessions. It is the purpose of this listing to prevent activity conflicts.

If you need to acquire use of the 36-inch telescope: remember two important IAS guidelines: 1) *There must be a telescope operator and assistant available* 2) *contact the Observatory Manager: John Shepherd for scheduling* **Contact via the webpage [iasindy.org](http://iasindy.org) under the contact us section.**

**DON'T WAIT UNTIL THE LAST MINUTE TO MAKE YOUR REQUEST OR YOU MAY NOT GET ACCESS.**

## **IAS News & Views Monthly Newsletter for the IAS**

### **Accessing the IAS News & Views**

The current Newsletter can be found on the website [www.iasindy.org](http://www.iasindy.org)

The monthly newsletter welcomes articles of local astronomical interest information and want ads:

Please submit to

The Indiana Astronomical Society, Inc

Jeff Patterson, editor

1780 S. Morgantown Rd

Greenwood, IN 46143

Phone: (317) 300-0449

[KB9SRB@hotmail.com](mailto:KB9SRB@hotmail.com)

### **Membership information Contact via the webpage [iasindy.org](http://iasindy.org) under the contact us section**

Contact any IAS officer or the Treasurer.

### **Pay Your Dues by PayPal**

We can now pay dues on our website using Paypal. There is a cart system where you can pay dues, order magazines, or donate to the Society. The cart is found in the Join the Society section of the website. You will have to establish a PayPal account for yourself to make the transactions.

### **Requests for Information**

You may contact our officers, Board members, and Coordinators via our website at [www.iasindy.org](http://www.iasindy.org). Place your cursor on the "Home" tab and then select "Contact us". You may then page down to the person you desire to contact and send an email message requesting information or a telephone call back. We will be happy to respond within a reasonable time frame.

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### **Logo Clothing**

The Board has developed a new supply of logo ware with our new logo using Mid Central Trophy in Kokomo, IN. Typically T shirts, sweatshirts, polo shirts, and caps are available. Now we are even making it easier for you. We have changed our method of order so that you can have better service. Call Linda, tell her this is an order for the IAS logo ware, discuss what you want and give her the size. She can determine the cost and shipping and mail the order to your home directly.

Linda

Mid-Central Trophy

422 Arnold Ct

Kokomo, IN 46902

765-453-5494

All Major credit cards are accepted.

Hours 9-5 EST

### May Calendar, 2013

**For a more detailed Calendar of Events see the webpage [www.iasindy.org](http://www.iasindy.org)**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		<b>30</b> Board Meeting 7PM	<b>1</b>	<b>2</b> 3rd QTR ☾	<b>3</b>	<b>4</b> Public Lecture 8 PM Link Observatory
<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b> New Moon ●	<b>10</b> IAS Campout at Link	<b>11</b> IAS Campout at Link
<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b> McCloud Star Gaze 1st Qtr ☾
<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b> Full Moon ○
<b>26</b>	<b>27</b>	<b>28</b> Board Meeting 7PM	<b>29</b>	<b>30</b>	<b>31</b> 3rd QTR ☾	<b>1</b> Public Lecture 8 PM Link Observatory