

The IAS News & Views



Volume 79, Issue 1

www.iasindy.org

IAS General Meeting January 14, 2012

7:00 PM

**Holcomb Observatory
Butler University**

Two Thousand Years of Astrometry; The Ongoing Revolution

Dr. Will Clarkson

Visiting Professor at Indiana University

Astrometry is the art of measuring the positions of objects on the sky. Among the oldest of astronomical techniques, it affords insights no other technique can match. Recent advances have wrought astonishing advances in astrometric precision, which are now enabling science projects that would have been thought impossible until very recently. I will first illustrate some of the ways in which astrometry has developed historically, with a focus on the ways in which it has overturned our thinking about the Universe. Then I will discuss some examples of modern astrometric science projects, including (but not limited to) the direct measurement of planetary orbits outside the Solar System, and the first example of an exciting new technique where the motions of stars across the field of view may be used to directly weigh the mass of the cluster of which they are a part. This may finally allow us to address fundamental questions of the star formation process that have eluded astronomers until the present. Finally I will close with a preview of what to watch for in the future; I will argue that another great leap in astrometry is imminent in the next few years.

I have been interested in Astronomy for as long as I can remember. I trained as a Physicist at Oxford University before returning to Astronomy for a PhD at the University of Southampton. Since then I have pursued post docs at the Open University, the Space Telescope Science Institute and UCLA, before joining the faculty at Indiana University, Bloomington as a visiting Assistant Professor. My research interests include the formation and evolution of structure in the Milky Way Galaxy, with a special focus on using very high precision astrometry of crowded fields to separate populations of interest by virtue of the way they move across the sky. I have used facilities all over the world and of all aperture sizes, from the 11-cm Super WASP survey for transiting extrasolar planets, to the 10-m twin Keck telescopes on Mauna Kea.

IAS NEWS

Election Night Results - December 17, 2011

The following people were elected as your officers and Board members for the coming year. Board members were elected for three year terms.

President -
Jeff Patterson

Vice President and Program Chairman -
Doug Brown

Treasurer:
John Shepherd

Secretary:
Betsy Brown

Board of Directors
John Molt
John Kramer

I personally would like to thank John Molt and Greg McCauley for their efforts as Board members these past three years. Both have worked hard to make your Society a better organization. They have helped me on countless occasions. When you see them please take a moment to thank them for their work.

The Pres

Board Appoints Two Board Members

The Board has appointed Bruce Bowman and Eric Allen to the Board to replace the vacant positions of Tom Borlik and Jeff Clemmens.

The Christmas Party

The Christmas party was a great success. We had over 25 people in attendance. We spent a lot of time just chatting and going over old times. It is good for us to just get together and chat every once in a while.

Other News

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. Thanks to John Shepherd and Doug Sanguetti for getting it done. It was not as easy as it seemed. 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.

Logo Clothing

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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

IAS Calendar of Events for January

January 14 General Meeting at Holcomb Observatory

January 17 Board Meeting

NASA Space Place

Dawn Takes a Closer Look

By Dr. Marc Rayman

Dawn is the first space mission with an itinerary that includes orbiting two separate solar system destinations. It is also the only spacecraft ever to orbit an object in the main asteroid belt between Mars and Jupiter. The spacecraft accomplishes this feat using ion propulsion, a technology first proven in space on the highly successful Deep Space 1 mission, part of NASA's New Millennium program.

Launched in September 2007, Dawn arrived at protoplanet Vesta in July 2011. It will orbit and study Vesta until July 2012, when it will leave orbit for dwarf planet Ceres, also in the asteroid belt.

Dawn can maneuver to the orbit best suited for conducting each of its scientific observations. After months mapping this alien world from higher altitudes, Dawn spiraled closer to Vesta to attain a low altitude orbit, the better to study Vesta's composition and map its complicated gravity field.

Changing and refining Dawn's orbit of this massive, irregular, heterogeneous body is one of the most complicated parts of the mission. In addition, to meet all the scientific objectives, the orientation of this orbit needs to change.

These differing orientations are a crucial element of the strategy for gathering the most scientifically valuable data on Vesta. It generally requires a great deal of maneuvering to change the plane of a spacecraft's orbit. The ion propulsion system allows the probe to fly from one orbit to another without the penalty of carrying a massive supply of propellant. Indeed, one of the reasons that traveling from Earth to Vesta (and later Ceres) requires ion propulsion is the challenge of tilting the orbit around the sun.

Although the ion propulsion system accomplishes the majority of the orbit change, Dawn's navigators are enlisting Vesta itself. Some of the ion thrusting was designed in part to put the spacecraft in certain locations from which Vesta would twist its orbit toward the target angle for

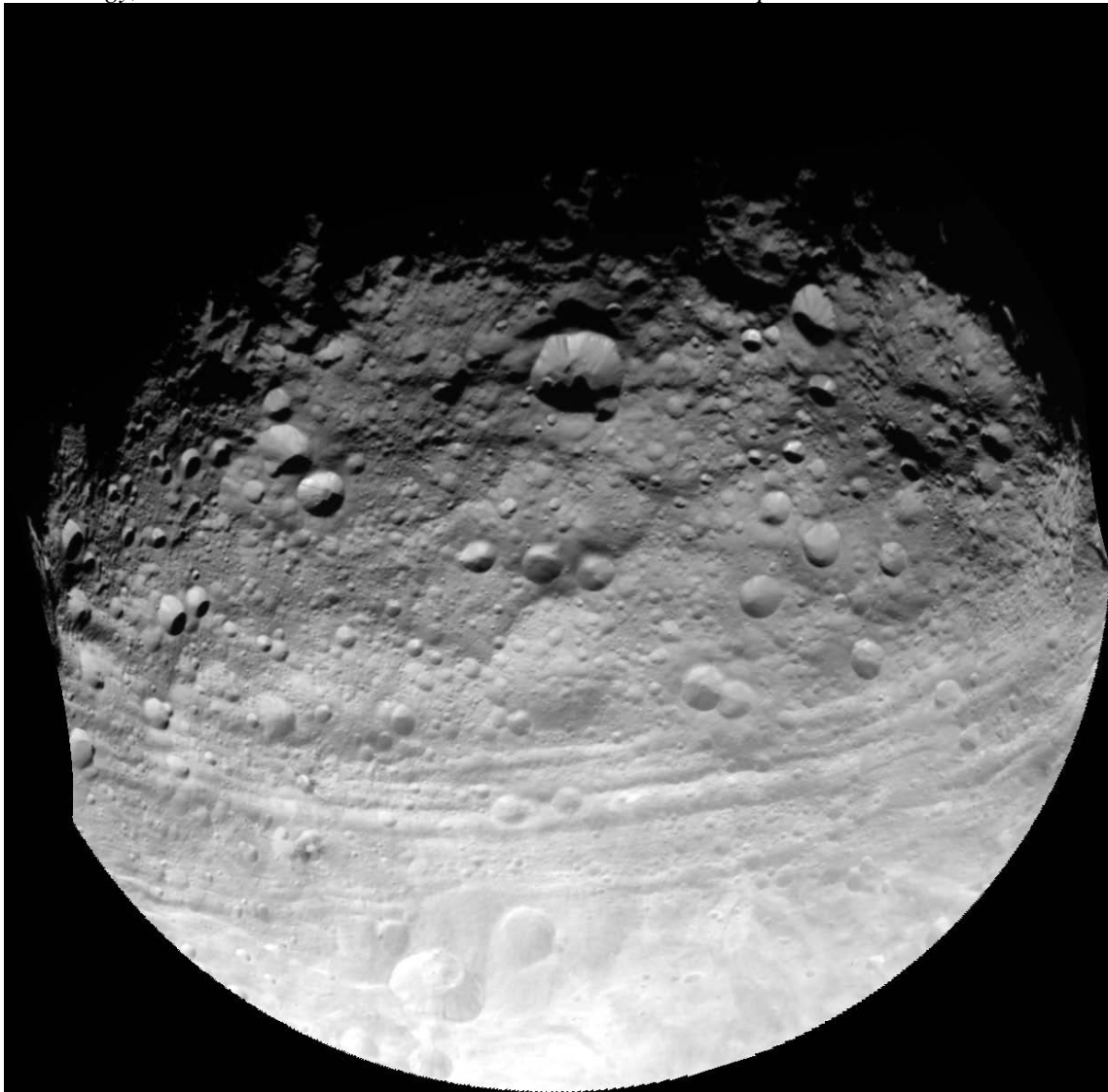
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the low-altitude orbit. As Dawn rotates and the world underneath it revolves, the spacecraft feels a changing pull. There is always a tug downward, but because of Vesta's heterogeneous interior structure, sometimes there is also a slight force to one side or another. With their knowledge of the gravity field, the mission team plotted a course that took advantage of these variations to get a free ride.

The flight plan is a complex affair of carefully timed thrusting and coasting. Very far from home, the spacecraft is making excellent progress in its expedition at a fascinating world that, until a few months ago, had never seen a probe from Earth.

Keep up with Dawn's progress by following the Chief Engineer's (yours truly's) journal at <http://dawn.jpl.nasa.gov/mission/journal.asp>. And check out the illustrated story in verse of "Professor Starr's Dream Trip: Or, how a little technology goes a long way," at <http://spaceplace.nasa.gov/story-prof-starr>.

This article was provided courtesy of the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



This full view of the giant asteroid Vesta was taken by NASA's Dawn spacecraft, as part of a rotation characterization sequence on July 24, 2011, at a distance of 5,200 kilometers (3,200 miles). Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA

Observing Activities

Activities for January:

Link Observatory - None Planned

McCloud Activities– None Planned

Prairie Grass Observatory Activities–

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:

For those interested in going to The Link Observatories for observing call John Shepherd at 1 317-862-3442.

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.

Other Observing Activities

Star Gazer

December 9, 2011

Stargazer #570

Tycho Brahe, an Unlikely Revolutionary

December 14 is the 465th birthday of Danish astronomer Tycho Brahe (1546-1601), one of five key players in the 150-year long Copernican revolution – a revolution he didn't even fully support.

Up to their time, it was believed the Earth was the center of all creation, a view called the geocentric theory. In the 1530s, Nicolaus Copernicus (1473-1543) postulated that the Sun was at the center, called the heliocentric theory – but he had no observational evidence to support his radical theory. With the newly invented telescope, Galileo Galilei (1564-1642) began finding supporting evidence in 1610, but using the then-prevailing view that planetary orbits are circular, the heliocentric theory still wasn't convincing.

About this same time, Johannes Kepler (1571-1634) discovered that planetary orbits are elliptical, not circular, and when this was applied to Copernicus' heliocentric view, things fell into place – although ironically Galileo was never convinced of elliptical orbits. The fifth player, Isaac Newton (1642-1727), in the 1680s discovered and set forth the laws of gravity to further explain planetary motions. So where did Tycho Brahe come in? He furnished the data without which mathematician Kepler would never have discovered elliptical orbits.

The son of a prominent Danish nobleman, Tycho's life was both colorful and full of ironies. At age 2 he was kidnapped and raised by an uncle and aunt. Before his birth his parents promised him to his father's brother and wife as they were unable to have children, however after his birth, his parents began to have second thoughts – so he was kidnapped. Apparently, no hard feelings resulted as the families remained close.

Tycho received an education befitting a nobleman, but he also had a brash tempestuousness about him that he came to regret on occasions. At age 20, he got into a duel and suffered a disfiguring injury when his rival's sword removed the bridge of his nose. Being a resourceful chap, he fashioned a prosthetic nose-piece of silver and gold which he affixed with a wax paste and wore the rest of his life.

At the age of 25 he fell in love with Kirstin, a Lutheran minister's daughter. Since she was a commoner and he a nobleman they couldn't officially marry, so they lived together as husband and wife, establishing a common-law marriage. It lasted 30 years until Tycho's death, and produced eight children, six of whom lived to adulthood.

His family intended that he go into law, but being star-struck at age 13 by a solar eclipse, he began his own personal astronomical studies along with his other formal studies. He quickly recognized the imprecision and inconsistencies of the astronomical books and charts of the day, and at age 17, set forth his life goal when he wrote:

“I've studied all available charts of the planets and stars and none of them match the others. There are just as many measurements and methods as there are astronomers and all of them disagree. What's needed is a long term project with the aim of mapping the heavens conducted from a single location over a period of several years.” Truly remarkable for a renaissance teenager. In 1573, he wrote *De Stella Nova* about a “new star” he had observed the previous year – now known as Supernova 1572.

In 1576, at age 29, Tycho was given, by the king of Denmark, the small island of Hven and funds for the construction of an observatory. Here he spent much of the next 20 years making the observations for which he is famous.

He constructed many of his own astronomical instruments and invented others. Born with exceptional eyesight, he became one of the great observers in astronomical history. Ironically he died eight years before the invention of the telescope – the instrument that revolutionized observational astronomy.

[Image: Wood carving depicting Tycho in his observatory with his mural (wall) quadrant.]

With remarkable precision, he charted the locations of 777 stars and compiled tables of motions of the then-known five planets. Shortly before his death, Tycho was joined by the 29-year old mathematician Johannes Kepler in what proved to be a scientifically fateful collaboration. They worked together only a year or so, but following Tycho's death, Kepler used Tycho's 20 years of measurements of the positions of Mars to discover the elliptical nature of planetary orbits – an enormously significant contribution to the Copernican revolution.

Ironically, although Tycho was a contemporary of Galileo, there is no indication they ever met. In fact, Galileo, 18 years younger, was a mathematics professor who didn't get into astronomy seriously until after Tycho's death.



While Tycho reportedly admired Copernicus, he never knew him, having been born three years after Copernicus died. Furthermore, he never came to agree with Copernicus' heliocentric theory, and even came up with his own theory, known as the Tychonic system, which enjoyed favor for a time. Yet, it was his accurate and meticulously recorded observations that doomed his own theory and led to the eventual acceptance of Copernicus'.



[Image: Eduard Ender painting believed to be Tycho demonstrating a celestial globe to his last benefactor Emperor Rudolph II in Prague.]

Tycho Brahe died rather suddenly at the age of 54, and the cause of his death is still a mystery. Initially attributed to kidney stone complications, his body was exhumed in 1901 and when no stones were found, the cause of death was cited as uremia. Later studies found toxic levels of mercury in his body – he also dabbled in alchemy – and it is now believed he died from mercury poisoning. Stargazer appears twice-monthly in the *Waco Tribune-Herald* and 60+ other newspapers. Paul Derrick is an amateur astronomer who lives in Waco. To be added to (or removed from) this free e-mail reminder, send your e-mail address (and name) to paulderrickwaco@aol.com.

Paul Derrick

918 N. 30th St. * Waco, TX 76707
254-753-6920 (home) * 254-723-6346 (cell)
See my Stargazer website at:
**** stargazerpaul.com ****

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 monthly during our 2011 and 2012 observing seasons. And if you want to follow the Sun in between our monthly Solar Telescope openings, the website 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.

IAS LIBRARY:

There is a link on our website page for our Multi-Media Library containing a multitude of videos that are on the web. We think it will be a great addition to our library for both novices and experienced observers.

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.

Based upon the responses we received to your intro question recently, perhaps we should add a section to the bulletin naming those members who would be willing to receive calls for help on **specific subjects**.

William Conner (wmtconner@att.net) - for CCD imaging and film photography.

Jeff Patterson (Contact Jeff via the webpage iasindy.org under the contact us section) – Observatory design and construction

Eric Allen (ericandroberta@sbcglobal.net) - Telescope making and mirror grinding

Brian Murphy (bmurphy@monumentcompanies.com) - "telescope construction and collimation".

Public Outreach Programs – If you want to schedule a program at the Link Observatory or at your site, please contact the following people:

Gerald Venne is our Public Events Coordinator. He will be responsible for coordinating Public Events for the IAS. To schedule a public event contact Gerald Venne (Contact Gerald via the webpage iasindy.org under the contact us section).

He needs your help. Let Gerald know if you would like to show the public our sky. We need people to help at Link and elsewhere. It is actually a lot of fun.

If you would like to schedule the Goethe Link Observatory, please contact John Shepherd. Contact John via the webpage iasindy.org under the contact us section)

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 Bulletin for 4 months and may be renewed at the owner's request.

IAS News and Views

To place an ad, contact:

Bulletin Editor

Jeff Patterson

1780 S. Morgantown Rd.

Greenwood, IN 46143

(317) 300-0449

E-Mail: KB9SRB@Hotmail.com

For Sale: MEADE 8" F/4.5 NEWTONIAN

Includes German Equatorial Mount with three counterweights, felt-lined mounting rings, RA and Dec slow motion controls, accessory tray and 6x30 finder scope. Eyepieces include 25mm MA and 9mm Ortho. All instruction manuals are included.

Additional Accessories:

- * Quartz RA motor drive incl battery pack
- * Polar alignment viewfinder
- * 12.5mm illuminated reticle eyepiece
- * Meade 60mm guidescope with mounting rings and 1.25" diagonal
- * 1.25" camera adapter
- * Piggyback camera bracket

Aluminized mirror has been cleaned and collimated. Optics are excellent, like new.

Telescope is in very good condition. A complete package for wide-field astrophotography and deep sky observation.

Asking \$450.00 – Call Bill at 892-2036 or e-mail at bwilhite@tds.net.

For Sale or Trade: CELESTRON HEAVY-DUTY TRIPOD, WEDGE, DRIVE, FORK ARMS

Heavy-duty tripod and wedge for the classic C8. Tripod has 2" legs that are extendable with step-locks and has a center post with an integral leg spreader. Wedge is cast iron with a hand-screw latitude adjustment. These components were built to last a lifetime and then some. I'm also including the drive base, fork arms, and power cord. This is the old-style base with the RA spur drive (no worm). The drive has slow-motion controls and setting circles and yes, it still works.

The C8 optical tube assembly is NOT included. \$300 takes all. I will also consider taking a good wide-field eyepiece in exchange (20mm f.l. minimum). Contact bruce.bowman@tds.net or call 317-539-2753

Equipment Loan Program

The Loan Program has been helpful to those new to the hobby and others in need of observing equipment. We consider offers of equipment you may not have need for any longer.

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. Philip Dimpelfeld **Contact via the webpage iasindy.org under the contact us section**

Board Meeting –January 17, 2012

The IAS Board Meeting is being held at 430 Massachusetts Avenue in downtown Indianapolis. The building is at the point of convergence of Mass. Ave., Vermont and Alabama Streets. There is a Starbucks located in the frontage of the building. The coffee shop stays open late into the evening. Try to park as close to Starbucks as possible, preferably in a metered space. On-street parking is free after 9pm. Some meter sites are still free after 6PM but are hard to find. . Handicapped parking is directly in front of Starbucks entrance. The entrance to the building is to the left of Starbucks around on the side. We meet in the basement. Ride the elevator (around the corner to your left) to the basement. Turn right as you exit the elevator and go through the first door on your right. This is the conference/meeting room. If you need further assistance, please contact Jeff Patterson via the webpage iasindy.org under the contact us section

2012 Calendar of Meetings

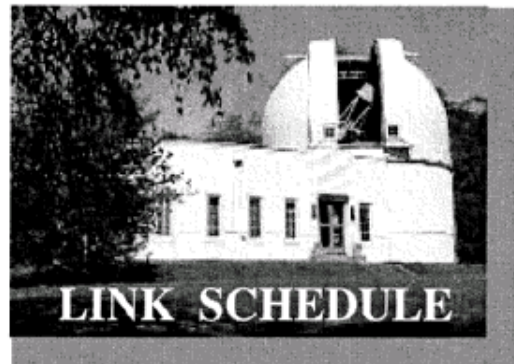
	NAG	General	Board
January		14	17
February		11	14
March		10	13
April	28	14	17

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 has to be two or more IAS members present.....*2) *contact the Observatory Manager: John Shepherd* **Contact via the webpage 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 Stats

Accessing the IAS News & Views

The current bulletin can be found on the website www.iasindy.org

IAS News and Views

IAS News & Views

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

Membership information Contact via the webpage iasindy.org under the contact us section

Contact any IAS officer or the Treasurer John Shepherd or Vicki Switzer

Observatory Manager

John Shepherd **Contact via the webpage iasindy.org under the contact us section**

Public Event Coordinator

Gerald Venne **Contact via the webpage iasindy.org under the contact us section**

Equipment Loan Program Coordinator

Philip Dimpelfeld **Contact Phil at philip.dimpelfeld@comcast.net**

Membership Coordinator

Vicki Switzer **Contact Vicki via the webpage iasindy.org under the contact us section**

January Calendar, 2012

For a more detailed Calendar of Events see the webpage www.iasindy.org

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 1 st QTR ☾	2	3	4	5	6	7
8	9 Full Moon ○	10	11	12	13	14 General Meeting Holcomb Observatory 7PM
15	16 3rd QTR ☾	17 Board Meeting 7PM	18	19	20	21
22	23 New Moon ●	24	25	26	27	28
29	30 1 st QTR ☾	31				