

Koch Planetarium ca 1952

Inside this Issue...

- 2, 3 - Local Events and Information
- 4 - December Calendar/ Events
- 5, 6 - Koch Immersive Theater
- 7 - The Heart of a Comet
- 8 - Upcoming Programs
- 9, 10 - Minutes of October meeting

From Koch Planetarium to Koch Immersive Theater

An amazing transition - Wow !!!

Scheduled to open February 1, 2014, the new Koch Immersive Theater is an impressive piece of architecture and current technology. Driving in along Riverside, one might think the famous [New York Hayden Planetarium](#) was just transplanted when seeing the 55-foot glass enclosed dome.

I visited with Mitch Luman, Science Director for the Evansville Museum, on October 9th to get a progress report and tour of the facility which is nearing completion. At first we chatted in the new science exhibit area about the history of the Koch Planetarium, the early planning stages for a replacement, design concept and development, and financial issues. Then we donned hardhats and explored the active construction area of a project that Mitch had given a 1 in 100 chance of ever happening.

The Beginnings of an Idea

In early 1996, Mitch contracted a feasibility study, and despite support from a museum committee, the governing body did not act on it.



Koch Immersive Theater - Oct. 2013

In May 2000, a formal request was made to refresh the report and begin renovations. Once again, no progress was made in planning until summer of 2004. By chance, a new architect had visited the museum and Mitch talked him into generating a few drawings at no charge. The renderings were widely circulated and the idea of new construction gained the support of the Board President. In 2005, a Master Plan was approved for the new ... see **Koch** p.5

The EAS newsletter, **Observer**, is published monthly. Anyone wishing to contribute articles or photos may mail them to the club's PO box: EAS, PO box 3474, Evansville, IN 47733, or e-mail them to the editor at: gneireiter@wowway.com

Local Events and Information

The **Evansville Astronomical Society** (EAS) is a non-profit organization fully incorporated in the state of Indiana. It has, as its primary goal, the advancement of amateur astronomy. Founded in 1952, the society seeks to:

- 1... maintain adequate facilities for its members and for the public in order to extensively study the skies, and
- 2... promote an educational program for those who wish to learn more about the science of Astronomy.

Meetings are held the third Friday of each month, except June, when the annual EAS picnic is held. The society also sponsors monthly Open House events during the warmer seasons that afford the public an opportunity to tour the observatory.

EAS 2013 Officers and Contacts

President - Scott Conner 812.604.7164
ssconner24@gmail.com

Vice President - Tony Bryan

Secretary - Charleen Kaelin 812.303.1711

Treasurer - Scott Bishop

Counselors - Michael Borman, Kent Brenton, and Ken Harris

Webmaster - Michael Borman

Program Director - open

Newsletter Editor - George Neireiter
812.629.7822 gneireiter@wowway.com

For more information about EAS or directions to the Observatory, visit the club's web page:
<http://www.evansvilleastro.org/>



Telescope mount upgrade status... On July 16, Scott Conner was notified that the new **Paramount ME II** was shipped. The mount arrived and is being stored at Scott's work place. Scott recently created 3D drawings to show exactly where to put the mount on the new pier. Here is Scott's latest update as of Oct. 31:

"The EAS mount has been started. The metal is all cut and the parts are currently being welded together. It should be ready for paint in a couple of weeks. We need to decide on a paint color. I am going to try and get it done at cost at a local powder coat paint shop. We can get it in either Gray or Black. **Please send me an email to let me know what you think.** My email is ssconner24@gmail.com."

We are still a little bit short of our project's financial goal. If you haven't contributed, please help out and make a contribution. While there have been some large donations of \$200 or more, your gift of \$25 or \$30, or even \$50, would help us achieve the total amount.

Please send your check to Scott Bishop, Treasurer, at: E.A.S., P.O. Box 3474, Evansville, IN, 47733. Or, even better, come to the next meeting (Sept. 20) and personally deliver your support of E.A.S. and its mission. Thank you.

PSW and Fall Cleanup... We had a member work day at the observatory on Oct. 12. Dave Kube, Ted Ubelhor, Tony Bryan, and I were the only ones to show up to work. We cleaned the floors, painted the wall in the stairway, cleaned the chairs, and mowed the lawn. Ted had to leave early so the three of us left enjoyed a good sandwich before the night observing started. Tony had to leave after eating, so Dave and I waited to see if anyone would show up.

At 7:00 am, we started to get the stuff out for doing a program. That is when we discovered that someone had taken the computer for some reason. It is a shame that we now have members, or a member, or one of their friends, who would do something like this to the club. We have been very lucky to have great members who have always looked out to help the club, not steal from it. I hope that whoever took, it for whatever reason, has the decency to return it with no questions asked. This act will cause things to be changed at the observatory so that it

see **PSW / Cleanup...** on page 3

PSW / Cleanup... continued from page 2

will not be so easy for anyone else to do something like this again.

As it turned out, we had 29 guests show up for a program. I did a program on telescopes with drawings on our white board. Then, Dave and I answered questions for a while. After that, Dave took half of the group up to the telescope, and I took the rest outside to do some constellation work. After about 20 minutes or so, we switched groups and did our best to keep them entertained.

The scout master thanked us for our time and said he would like to join the club. We gave him one of the printed forms, so maybe we have gained a member from this night.

I hope for the Spring Cleanup we have a little bigger turn out so we can do a much better job cleaning up around the observatory.

Submitted by: Ken Harris

Attention all members...

In addition to the issue of the missing laptop discussed in Ken Harris' PSW report, beer bottles were discovered in the trash at the observatory during the cleanup. **Beer and Alcohol are not permitted** at anytime on the EAS property.

Thanks, Scott Conner, President EAS

Telescopes and accessories for sale...

As mentioned in last month's issue, Mike Borman still has some telescope equipment and accessories for sale. Some of the gear has already been sold. If interested, go to Mike's web page. Here is the link:

<http://www.mborman.org/forsale.htm>

Submitted by Mike Borman

Comet C/2012 S1 (ISON) update...

As of October 25, Comet ISON remains on track to reach its closest approach to the Sun's surface (between 700 - 800 thousand miles) on November 28. While a terrific show is still possible, odds are it will not be as spectacular as some predicted as reported by Mike Wall of Space.com. Measurements of the comet's core is between 0.12 - 1.2 miles in diameter, which places it as an average to less than average sized comet. By comparison, the spectacular comet Hale-Bopp, in 1997, was 19 miles wide.

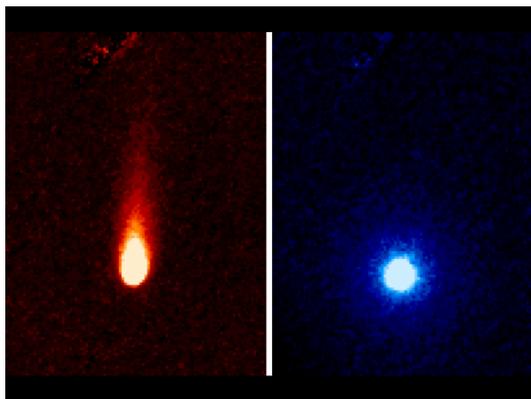
Besides the many amateur astronomers watching comet ISON with their binoculars and small telescopes, the NASA-organized CIOC (Comet ISON Observation Campaign) is coordinating a global effort using the Hubble Space Telescope, the Solar Dynamics Observatory, the twin STEREO probes, as well as the Solar and Heliospheric Observatory which is jointly operated by NASA and ESA.

Earlier in October, NASA and ESA used their Mars probes (Mars Express Orbiter and Mars Reconnaissance Orbiter) while the comet was within 6.5 million miles of Mars. And as the comet nears the Sun, NASA's Messenger probe, in the vicinity of Mercury) will participate in the comet watch.

One probe of NASA's will not be taking part anymore. The Deep Impact mission, which was launched in 2005, was recently declared dead by JPL. The comet hunting mission was highly successful with its encounter of comet Tempel 1 when an impactor probe hit the comet. However, JPL lost communication with Deep Impact in early August, perhaps because of a loss of control of the orientation, thus preventing positioning of the antennas and its solar arrays, which in turn results in loss of power; basically it froze to death.

While viewing the comet now requires terrestrials an early rise to see it in the eastern sky, the view will change in early December to the western sky just after sunset, a view that favors observers in the Northern Hemisphere. For a good Infographic, check out this artist's depiction by Karl Tate of Space.com.

By the way, for the many astrophotographers among us, there is a photo contest being sponsored by the National Science Foundation along with Astronomy and Discover magazines. Prizes up to \$2500 are available plus the winning images will be published in Astronomy magazine.



Nasa's Spitzer Space Telescope observes carbon dioxide from comet ISON.

EAS OBSERVER NEWSLETTER

December 2013

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2 New 	3	4	5	6	7
8	9 First 	10	11	12	13	14
15	16	17 Full 	18	19	20 Regular Mtg.	21
22	23	24	25 Last 	26	27	28
29	30	31				

Generated by FreeHTMLCalendar.com Copyright © 2011 John Dalbey.

November Events (reminder)...

Regular Meeting Nov 15 (Friday) 7:30 pm Wahnsiedler Observatory
(election of Officers)

Comet ISON watch ? Nov. 30 (tentative) 5 pm ? TBD

December Events...

Regular Meeting Dec 20 (Friday) 7:30 pm Wahnsiedler Observatory
(Scott Conner is Quiz Master)

Moon phase times (Evansville local time)

New Moon	Dec 2 6:23 pm	First quarter	Dec 9 9:12 am
Full Moon	Dec 17 3:29 am	Last quarter	Dec 25 7:48 am

courtesy of [Time and Date](#)

... **Koch** from p.1

planetarium and other renovations to the existing building.

Thus began a long series of planning, design, and fund raising activities from 2005 - 2009. Despite the great recession that began in 2008, funds were available for renovating the existing structure, which began in 2010, in phases. By 2012 the \$14 million goal in capital was successfully achieved -- an impressive task for a community the size of Evansville -- and the designing for the new "dome behind glass" began. By October, 2012, the new design was approved and funds were released to complete the project. Ground breaking began in November 2012. Mitch is proud to say that at no time during the "value engineering" process were any of the features of the planetarium diminished or compromised in any significant way.

Innovative Construction

Given the lack of experience of most construction firms in building a planetarium, a great learning process was involved. Per Mitch, the general contractor, Danco, and subcontractors exhibited great pride, craftsmanship, and quality in their work.

The dome began as a 17 meter (55 foot) inflatable, vinyl fabric sphere. Once attached to the foundation, and inflated with fans, the fabric was sprayed with a thin layer of polyurethane foam. Next came reinforced concrete that was gradually sprayed over the entire inner surface to a thickness of 4 inches. A subsequent inner dome of over 12 meters in diameter was constructed of perforated aluminum.

Up to 70 guests sit inside the inner dome on tiered seating, while the 9000 watt, 5.1 sound system, HVAC, and other support equipment resides between the inner and outer dome space. Full dome projection is accomplished with two JVC projectors auto-aligned with a Digistar 5 visual hardware and software system. The projection is tilted at 15 degrees.

In addition, the theater was designed for rental space and features two ellipsoid spot lights, a Panasonic DLP video projector, and lectern wired to the instructional projection system.

The dome has a light proof entrance vestibule featuring ceiling mounted cove lights to accent the curved surface along with an LCD messaging monitor for displaying greetings and personal messages while guests are entering or leaving the theater. In addition, there is a small area just outside the inner dome for equipment to do video production along with an adjacent room for housing a remote workstation using the same software as in the theater.

What's Ahead

By Thanksgiving 2013, Mitch takes ownership of the new dome and begins the final outfitting of the structure as well as the learning process for running the theater system. Currently planned to open on February 1, 2014, the theater will feature 5 programs: two full dome shows for families with children, two full dome shows for general audiences, and a live, interactive *Skies Over Evansville* program that makes use of the graphics capabilities of the Digistar 5 system.

The immersive theater will operate six days a week (closed on Mondays). For 2014, Mitch anticipates over 1000 shows will be presented.

And, of special note to EAS, Mitch has offered to host some of the regular meetings, such as during the winter months. This option is afforded by the fact that the theater and dome can be accessed directly from the parking lot, thus leaving the rest of the Museum to be secured during after hours. For sure, the Astronomy Day event for 2014 will be on a totally different scale than previous years. Nice !

My thanks to Mitch Luman for providing his time and his history document for preparing this article. In addition, except where noted, all pictures were provided by Mitch.



Pictures of the Koch Immersive Theater

All photos courtesy of Mitch Luman except where noted.

photo credit: George Neireiter



View from the parking lot



Tiered seating area

View just inside entryway



Artist's depiction

Mitch at the controls of the Digistar 5



photo credit: George Neireiter

editor's note: The usual monthly article from Space Place is not available. So I searched their website and found an interesting [article related to comets](#) -- seems appropriate in the month that begins to feature comet ISON.



What's in the Heart of a Comet ?

A comet's nucleus, or heart, is the solid chunk of something in the center of its fuzzy coma. As it approaches the Sun, some of its surface boils off and creates a long tail. But what IS inside a comet's nucleus?

A comet's nucleus is like a dirty snowball made of ice. As the comet gets closer to the Sun, some of the ice starts to melt and boil off, along with particles of dust. These particles and gases make a cloud around the nucleus, called a coma. The coma is lit by the Sun. The sunlight also pushes this material into the beautiful brightly lit tail of the comet.

Scientists have now had a look inside a comet's nucleus. On July 4, 2005, NASA's Deep Impact spacecraft's "smart impactor" scooped out, well more like blasted out, a crater in the nucleus of Comet Tempel 1. Here is what scientists have found.

The comet's nucleus is spongy, with lots of holes inside. No one knows yet whether there are a few large holes or many smaller ones. If there are a few large holes, it might mean that the comet was formed from large, dirty ice boulders. If there are many smaller holes, it might mean the comet was formed from many more dirty ice snowballs.

Parts of the surface are very fragile and weak. It may be that the comet's ice was the "glue" that held the comet dust and rocks together. Then, as the comet came closer to the Sun, the surface ice evaporated, leaving little or no "glue." The rocky and dusty structures would then be fragile and crumbly.

The surface of the nucleus is covered with fine dust, like baby powder. Originally, the comet's surface ice probably contained a lot of fine dust. When the orbit of the comet brings it close to the Sun, the ice evaporates into space, leaving some of the fine dust sitting on the

surface. The dust is fine like talcum powder because comets are too small to have enough gravity to squeeze the dust together into larger particles.

The surface is very black. The very black material on the surface is carbon-based material similar to the greasy black goo that burns onto your barbecue grill. The comet originally formed from ices (mostly water ice), silicate dust (like powdered beach sand), and this type of black space gunk.

Some parts of the nucleus are smooth and young, while other areas are cratered and old. The old-looking part of the surface has been battered for thousands of years by small, rocky asteroids or other comets. So why are some areas smooth? It is possible that as the comet has approached the Sun over the years, the ices on the surface have vaporized, and taken some of the embedded dust particles with it. Then, some of the dust particles could have settled back down on the surface, filling in some of the craters. Or, maybe the smooth surface areas that are covered with dust and dirty ice are disappearing as the comet repeatedly gets close to the Sun. After a long time, the smooth icy regions may have retreated, revealing the older cratered surface below.

The nucleus seems to have formed from overlapping layers of different materials. The layers must have formed as the comet grew. As it got bigger, gravitational forces drew in ices, dust, and the black "space gunk" from the comet's neighborhood.

There is ice beneath the surface, both water ice just below the surface and carbon dioxide ice (also known as "dry ice") farther down. Most of the ice in our solar system, including the ice in comets, is water ice. In Comet Tempel 1, almost all the ice is water ice, but some is carbon dioxide ice—or "dry ice." Carbon dioxide ice vaporizes faster than water ice. (That is why you might use "dry ice" to make "smoke" for a model volcano or "fog" for a stage play.) As the

comet gets close to the Sun, the carbon dioxide ice will vaporize before the water ice. So, after thousands of years, even though the two kinds of ice were initially mixed together near the surface, only the water ice remains. The carbon dioxide ice a meter or so beneath the surface is more protected from the Sun's heat, so may survive, with water ice above it.

Tempel 1 contains materials from the outer, middle, and inner parts of the solar system.

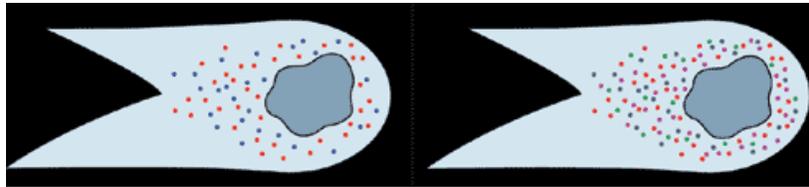
Why? We are not sure. Comets probably formed in the outer solar system. The inner solar system type of dust particles found in them could have traveled to the outer solar system where the comets formed. Or, not as likely, these dust particles could have arrived from other solar systems. Water and carbon dioxide ices are both found in the outer solar system, so comets could pick up both ices while forming.

Of course, not every comet may be just like Tempel 1. Deep Impact blasted lots of material from beneath the surface into the comet's coma. Remember, the coma is the cloud of dust and gas that boils off the nucleus as the comet's orbit takes it closer and closer to the Sun.

The coma contains material from near the surface of the nucleus. This material is what the Sun heats up most and what boils off first. Scientists saw what was in the coma right after the impact, and compared that with what was there before the impact. This way, they could get an idea what was added from the material blasted out of the hole in the nucleus.

But, whether before or after the blast, how do the scientists know what the coma is made of? After all, the comet and its coma are millions of miles away!

Here's how: They observe the coma through a telescope equipped with a [*spectrometer*](#). A spectrometer creates something like a rainbow. Like droplets of water may do after a rain, a spectrometer breaks light apart into its different wavelengths, or "colors." Depending on what gases (such as those in air) the light has passed through, the "rainbow" will look different. That is because each gas absorbs one or more single colors of the light that passes through it.



Comet Tempel 1's coma before impact. Colored dots stand for different materials that have boiled off the surface of comet's nucleus.

Comet Tempel 1's coma after impact. Added dots, some of different colors, stand for materials from below the surface of the nucleus that were "splashed" into the coma from the impact crater.

Upcoming Programs...

November

Date: Friday the 15th, at about 8:15 pm, following the Business Meeting

Presenter: Scott Conner

Topic: Comet ISON

EAS OBSERVER NEWSLETTER

EAS Meeting Minutes -- October 18, 2013

The E.A.S. MEETING for October 18, 2013 was called to order by President Scott Conner at 7:36 pm. There were 10 members and several guests present.

The Secretary was not present, but the membership voted to accept the September meeting minutes as published in the October newsletter.

Our Vice President Tony Bryan told us about the following upcoming events...

Regular Meeting	Fri., Nov 15	7:30 pm
Comet ISON	Sat., Nov 30	????? to be determined if comet is good
Regular Meeting	Fri., Dec 20	7:30 pm (Scott Conner Quiz Master)

The visitors introduced themselves.

Scott Bishop our treasurer told us about our finances. Scott also announced that monthly calendars are available for \$7. If you want a weekly calendar, you need to let him know before the next meeting. They are usually \$13.

Special Projects: Scott has not heard many concerns about the mount, so he plans to go forward with the design that was presented at the last meeting. He can't give a completion date at this point. It will depend on how much time is available for construction.

There is no new information about the Crane Educational Partnership.

Old Business

We participated in the "The Ferdinand Folk Festival" on Saturday September 21. Dave Kube, Tony and Donna Bryan, and Ted Ubelhor, and Ana Inauri all attended the event. The weather was good and so was the entertainment.

We had our Fall/ Winter Cleanup last Saturday, followed by sandwiches, and a PSW. Member attendance was very low. We only had four members attend the cleanup and two people attend the PSW. We did have a good turnout from the public. There were 29 guests. The weather was marginal but they did get to see the Moon.

New Business

Patoka Lake wants to know if we want to schedule a rain date for Patoka Lake this year. So we have set the date of July 19th as the rain date.

We are doing a presentation at the Library in Tell City on Monday November 11 at 6:30 pm. We will start off with a multimedia presentation at 6:30 pm and follow it with telescopes if the skies are clear. If you can help out, please let Scott Conner know.

EAS OBSERVER NEWSLETTER

We have been asked to provide telescopes at Wesselman Woods on Saturday Oct 26th. We will setup at dusk. Currently, there are zero volunteers for this event. If you want to help out, let Scott Conner know ASAP.

Comet ISON is starting to brighten in the early morning sky this month. It is going to pass by the Sun on November 28th, then race out of the solar system. At this point it is not expected to be the spectacular comet that it was thought to be, but it still could be a decent object to view. It will be in the morning sky until around Christmas. Depending on how bright it gets and whether it survives the close encounter with the Sun, it may be visible to the unaided eye around Christmas in the evening sky.

Don't forget this month we are collecting dues for this year. If you have not paid your dues, you can send them to the PO Box 3474 Evansville, IN 47733. The dues are \$40 per year for family, and \$35 per year for single.

We have been asked to do a tour for a church group on a Wednesday night soon. It would only be an observation. If anyone is available to do the tour let Scott Conner know. He needs to set a date with her tomorrow. Nov 6 or 13th would have the Moon available.

Don't forget elections are next month. Currently we are looking for a president and a treasurer, if you are interested in either position they are available. Please let an officer know if you want to be nominated.

Dave Kube has donated and installed several new lights at the observatory. It is much brighter now. We can still use a few more new light fixtures. Dave has volunteered to install them if anyone wants to donate money for or purchase some new fixtures for the club.

Dave also did some repair work on the lawnmower deck to get through the season. He will take it home this winter to do a better repair.

The meeting ended around 8 pm and was followed by a program called "History of the Birr Telescope in Ireland" by Victor Lopez.

Respectfully Submitted,

Scott Conner
President