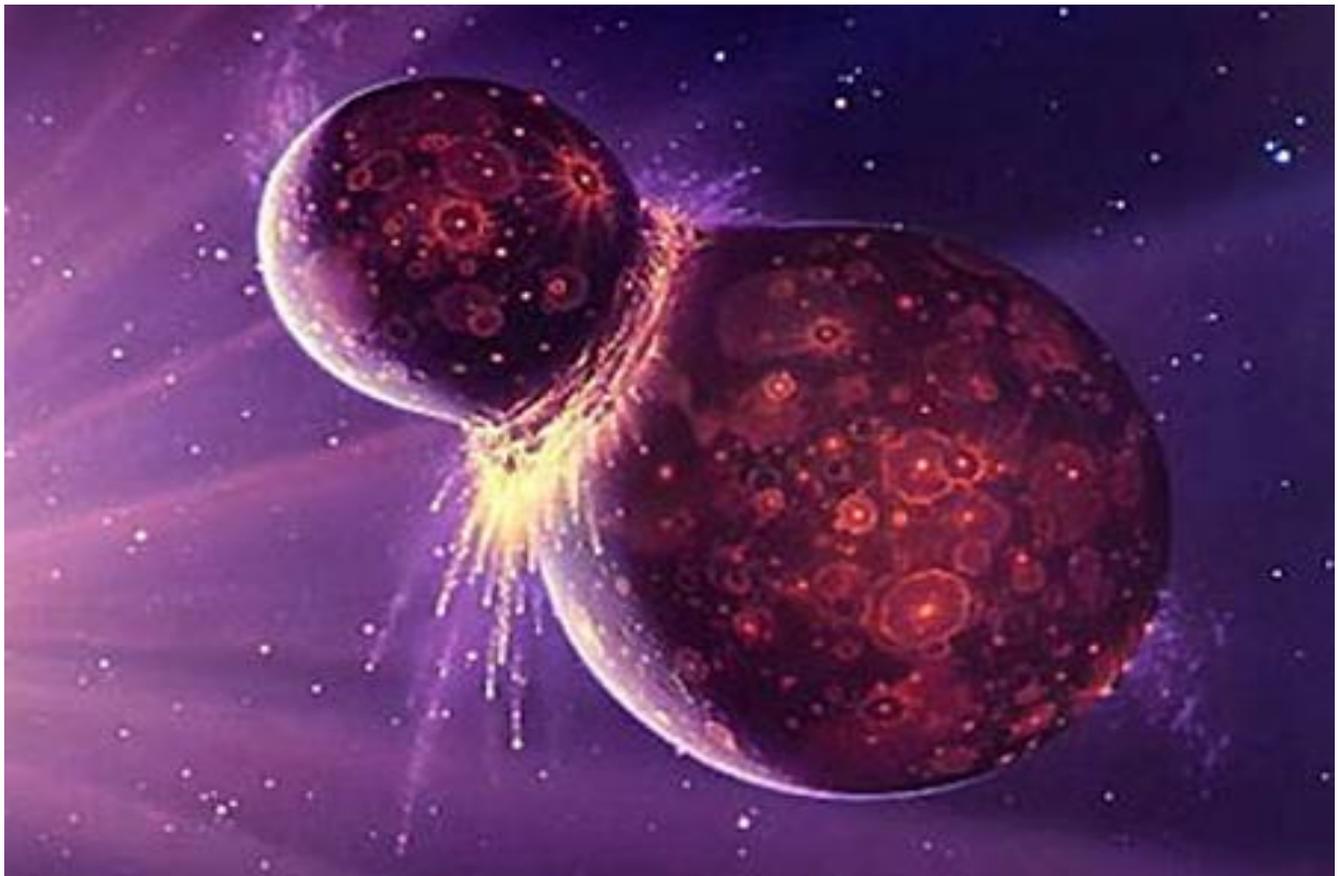


## Giant Impact Hypothesis -

Scientists now believe that we were not alone in our orbit around the sun. We had a twin planet called Theia, which was about the size of Mars. Some 4.5 billion years ago, Theia crashed into earth. Most of the planet was absorbed, but a large chunk blew off which later formed our moon. (cont. on pg 5)

### Inside this Issue.....

- 2 - Local Events and information
- 3 - News around the Globe
- 4 - March Calendar/ Events
- 5 - Giant impact Hypothesis Continued
- 6 - EAS Business - Minutes



Artist's conception of the hypothetical impact of Theia and young Earth  
Credit: NASA/GSFC  
Continued on Page 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: [dasiceman@yahoo.com](mailto:dasiceman@yahoo.com)

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 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 2014 Officers and Contacts

President – Scott Conner  
812-604.7164  
[ssconner24@gmail.com](mailto:ssconner24@gmail.com)

Vice President – Tony Bryan

Secretary – Charleen Kaelin  
812.303.1711

Treasurer – Ted Ubelhor

Counselors  
Michael Borman  
Kent Brenton  
Ken Harris

Webmaster – Michael Borman

Program Director  
Tony Bryan

News editor – David Kube  
[dasiceman@yahoo.com](mailto:dasiceman@yahoo.com)

For more information about the EAS or directions to the Observatory, please visit the club's web page:

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



## Local Events and Information

The EAS Newsletter – **OBSERVER** – has a new editor. Let me introduce myself.

My name is David Kube and I have been a member of the EAS for 5 years.

I have taken part in many of the public events and enjoy sharing my knowledge with anyone that has an interest.



As the newsletter editor, I would urge members to forward any photos or newsworthy information regarding the EAS to my Email address.

[dasiceman@yahoo.com](mailto:dasiceman@yahoo.com)

Any article suggestions are always appreciated.

I hope I can follow in the footsteps of those before me and provide an interesting and informative publication.

### EAS Schedule Update:

Currently there is only a tentative schedule available and therefore I have only posted the upcoming meetings in the newsletter Calendar.

The board is scheduled to meet on February 23<sup>rd</sup> at 1:30pm

### Telescopes and accessories for sale...

As mentioned in last month's issue, Mike Borman still has some excellent telescope equipment and imaging 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>

There is currently no update regarding the mount as we are waiting on the crane company to give us confirmation and a date.

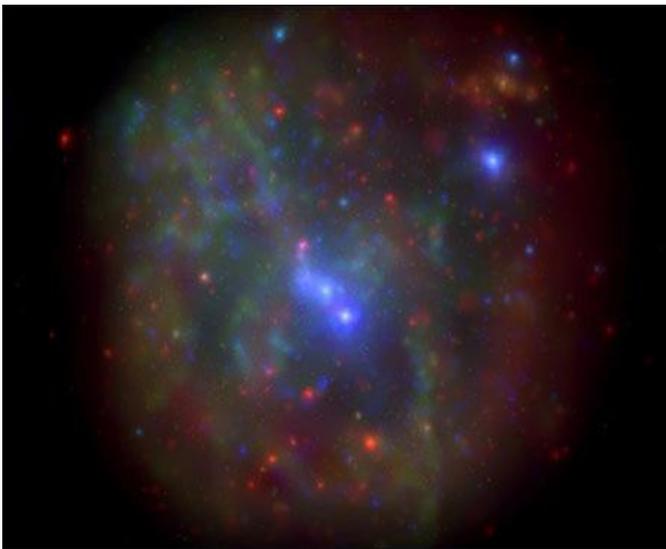
**Herschel telescope detects water on dwarf planet**



NASA/JPL

Scientists using the Herschel Space Observatory have made the first definitive detection of water vapor on the largest and roundest object in the asteroid belt, Ceres. Plumes of water vapor are thought to shoot up periodically from Ceres when portions of its icy surface warm slightly. Ceres is classified as a dwarf planet, a solar system body bigger than a typical asteroid and smaller than a planet. "This is the first time water vapor has been unequivocally detected on Ceres or any other object in the asteroid belt and provides proof that Ceres has an icy surface and an atmosphere," said Michael Küppers of the European Space Agency in Spain.

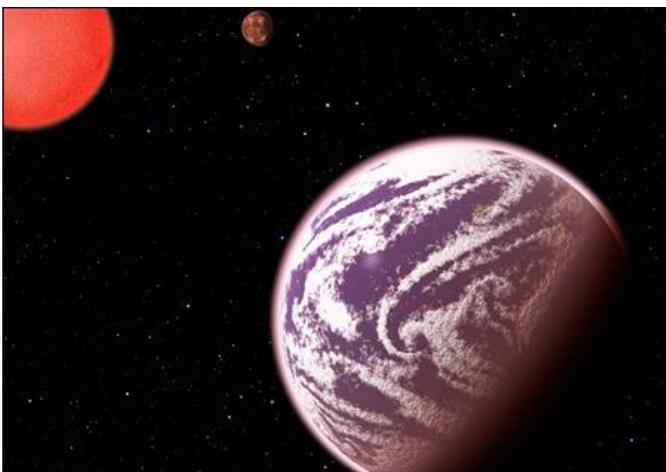
**A rare crash at the Milky Way's core**



Nathalie Degenaar

Astronomers are set to witness a rare collision expected to happen at the center of our galaxy by spring. With NASA's orbiting Swift telescope, a University of Michigan team is taking daily images of a mysterious gas cloud about three times the mass of Earth that's spiraling toward the supermassive black hole at the Milky Way's core. From our vantage point, the core lies more than 25,000 light-years away in the southern summer sky near the constellations Sagittarius and Scorpius. In 2011, German astronomers discovered a gas cloud called G2. They expected it to hit the black hole called Sagittarius A\* (pronounced "Sagittarius A-star") late last year. That didn't happen, but the cloud continues to drift closer. Astronomers now predict that the impact will occur in the next few months. Astronomers have never seen anything like this, much less with a front-row seat.

**Newfound planet is Earth-mass but gassy**



An international team of astronomers has discovered the first Earth-mass planet that transits, or crosses in front of, its host star. Kepler-314c (also called KOI-314c) is the lightest planet to have both its mass and physical size measured. Surprisingly, although the planet weighs the same as Earth, it is 60 percent larger in diameter, meaning that it must have a very thick gaseous atmosphere. "This planet might have the same mass as Earth, but it is certainly not Earth-like," said David Kipping of the Harvard-Smithsonian Center for Astrophysics (CfA) in Cambridge, Massachusetts. "It proves that there is no clear dividing line between rocky worlds like Earth and fluffier planets like water worlds or gas giants."

March 2014

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21 Monthly Meeting 7:30pm	22
23	24	25	26	27	28	29
30	31					

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**Tentative Schedule 2014**

**Regular Meeting Friday, Feb 21 7:30pm**

**Board Meeting Sunday, Feb 23 1:30pm**

**Regular Meeting Friday, Mar 21 7:30pm**

**Moon Phases**

First Quarter	Full Moon	Third Quarter	New Moon
Mar 8, 2014	Mar 16, 2014	Mar 24, 2014	Mar 1 & Mar 30 2014

[Moon Phases courtesy of Time and Date.com](http://Time and Date.com)

The **Giant Impact Hypothesis** states that the Moon was formed out of the debris left over from a collision between the Earth and a body the size of Mars, approximately 4.5 Gya (four and a half billion years ago). The colliding body is sometimes called Theia, for the mythical Greek Titan who was the mother of Selene, the goddess of the Moon.

The giant impact hypothesis is currently the favored scientific hypothesis for the formation of the Moon. Supporting evidence includes: the Earth's spin and Moon's orbit having similar orientations, Moon samples indicating the surface of the Moon was once molten, the Moon's relatively small iron core, lower density compared to the Earth, evidence of similar collisions in other star systems (that result in debris disks), and that giant collisions are consistent with the leading theories of the formation of the solar system. Finally, the stable isotope ratios of lunar and terrestrial rock are identical, implying a common origin. The moon-forming collision would have been only one such giant impacts and, perhaps, the last.

Astronomers think the collision between Earth and Theia happened about 30–50 million years after the Solar System began to form. Theia is thought to have struck the Earth at an oblique angle. Computer simulations of this "late-impact" scenario suggest an impact angle of about 45° at a velocity below 4 km/s. Theia's iron core would have sunk into the young Earth's core, and most of Theia's mantle accreted onto the Earth's mantle, however, a significant portion of the mantle material from both Theia and the Earth would have been ejected into orbit around the Earth. This material quickly coalesced into the Moon (possibly within less than a month, but in no more than a century). The Earth would have gained significant amounts of angular momentum and mass from such a collision. Regardless of the speed and tilt of the Earth's rotation before the impact, it would have experienced a day some five hours long after the impact, and the Earth's equator and the Moon's orbit would have become coplanar in the aftermath of the giant impact.

There is also a growing theory that this collision created not one but 2 orbiting bodies around the earth and later merged to form or existing moon of today.



Artist's depiction of a collision between two planetary bodies.  
Such an impact between the Earth and a Mars-sized object likely formed the Moon  
[Courtesy Wikipedia.org/wiki/Giant impact hypothesis](https://www.wikipedia.org/wiki/Giant_impact_hypothesis)

**Editor's Note:**

I was inspired to write this article after viewing an episode of  
"How the Universe Works" on the Science/ Discovery Channel.  
Season 2 Episode 8 – Birth of the Earth

*EAS Meeting Minutes – January 17<sup>th</sup>, 2014*

Currently at the time of the writing of this Newsletter – Previous meeting minutes were unavailable.