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## Our Solar System Is Almost Normal, But Not Quite

By Ethan Siegel

It was just over 20 years ago that the very first exoplanet was found and confirmed to be orbiting a star not so different from our own sun. Fast forward to the present day, and the stellar wobble method, wherein the gravitational tug of a planet perturbs a star's motion, has been surpassed in success by the transit method, wherein a planet transits across the disk of its parent star, blocking a portion of its light in a periodic fashion. Thanks to these methods and NASA's Kepler spacecraft, we've identified many thousands of candidate planets, with nearly 2,000 of them having been confirmed, and their masses and densities measured.

The gas giants found in our solar system actually turn out to be remarkably typical: Jupiter-mass planets are very common, with less-massive and more-massive giants both extremely common.

*(continued on Page 3)*

## President's Article

By Tim Campbell

### The Time Machine

Most of my articles have been somewhat "status" oriented, but occasionally I feel the need to share something more to the core of the passion I feel for astronomy. This will be one of those articles.

When we look through the telescope, we are always looking back in time. While we can certainly "look" back in time, we can't "touch" or "change" it. This "look but don't touch" time-machine of astronomy has always fascinated me.

The light from the suns in the Andromeda galaxy left in the direction of our Earth some 2.5 million years ago.

*(continued on Page 2)*

# STAR STUFF

Nov/Dec 2015 - Vol. 25 No 11

STAR STUFF is published eleven times each year by:

**FORD AMATEUR ASTRONOMY CLUB**  
P.O. Box 7527  
Dearborn MI 48121-7527

PRESIDENT: Tim Campbell  
VICE PRESIDENT: Tim Dey  
SECRETARY: Ellen Duncan  
TREASURER: Gordon Hansen  
WEBMASTER: Greg Ozimek  
NEWSLETTER EDITOR: Jennifer Monske

## Club Information:

The Ford Amateur Astronomy Club (FAAC) meets on the fourth Thursday each month, except for the combined November/December meeting on the first Thursday of December - at Henry Ford College Administration Services and Conference Center in Dearborn. Refer to our website for a map and directions ([www.fordastronomyclub.com](http://www.fordastronomyclub.com)).

The FAAC observes at Spring Mill Pond within the Island Lake State Recreation Area near Brighton, Michigan. The club maintains an after-hours permit, and observes on Friday and Saturday nights, and nights before holidays, weather permitting. The FAAC also has use a private observing site near Gregory Michigan and lake Erie Metro Park. See the FAAC Yahoo Group\* for more information.

Observing schedules and additional info are available on our website, or via the FAAC Yahoo Group.\* Or call the FAAC Hotline, for info and leave a message, or ask questions: 313-757-2582. or send email inquiries to [info@fordastronomyclub.com](mailto:info@fordastronomyclub.com).

Membership in the FAAC is open to anyone with an interest in amateur astronomy. The FAAC is an affiliate of the Ford Employees Recreation Association (F.E.R.A.). Membership fees:

Annual - New Members: \$30 (\$15 after July 1)  
Annual - Renewal: \$25 (\$30 after January 31)

Membership includes the STAR STUFF newsletter, discounts on magazines, discounts at selected area equipment retailers, and after-hours access to the Island Lake observing site.

## Astronomy or Sky & Telescope Magazine Discounts

Obtain the required form from the FAAC club treasurer for a \$10 discount. Send the completed form directly to the respective publisher with your subscriptions request and payment. Do not send any money directly to the FAAC for this.

## Star Stuff Newsletter Submissions

Your submissions to STAR STUFF are welcome! Send your story and/or images to the editor: [StarStuff@fordastronomyclub.com](mailto:StarStuff@fordastronomyclub.com) Email text or MS Word is fine. STAR STUFF will usually go to press the weekend prior to each general meeting. Submissions received prior to the 15th can be included in that issue.

\* FAAC Members are welcome to join our Ford Astronomy Club Yahoo!Group. Messages photos, files, online discussions, and

*This months background photos of the moon Page 1 courtesy of John Kirchhoff. See more of John's photos at:*

<http://www.flickr.com/photos/33926475@N06/with/4311533997/>

When you consider how long ago anthropologists believe homo-sapiens evolved or how long ago any hominid creatures evolved, you realize that the light from this galaxy left on its journey to Earth when no humans existed and even in the existence of hominid creatures is not certain (hominids are believed to have showed up somewhere between 1 Mly and 4Mly ago.)

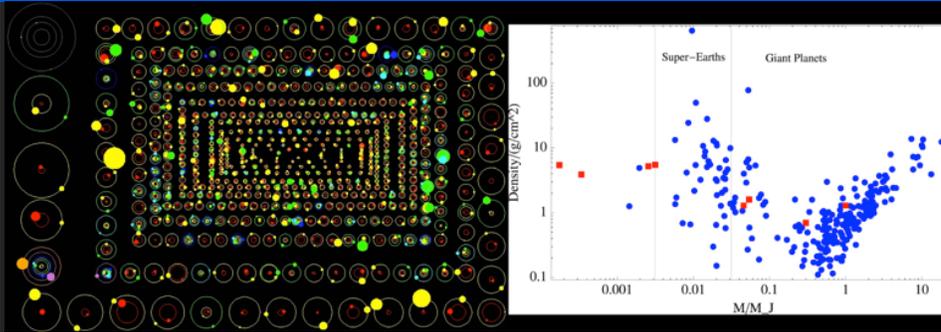


(You can see a larger version here: <https://www.flickr.com/photos/thevirtualtim/22961315286/in/dateposted-public/lightbox/>)

We see Andromeda not as it is, but as it was back then. When the light leaving those stars were just beginning their journey, the telescope, camera, nor humans didn't exist. Eventually humans evolved, developed the technology, and a telescope and camera were set up and in position for the light just as it was finishing it's journey (hopefully managing to miss the clouds on the way to our telescope)... catching the image "in the nick of time" (if you'll pardon the pun).

In this same amount of time, quite a lot has happened in this galaxy. Many new stars have formed while others have died. Super-novae have exploded. Not just a few super-novae — tens of thousands of them — that no human has ever seen because the light hasn't reached us yet.

(continued on Page 5)



*Images credit: NASA / Kepler Dan Fabricky (L), of a selection of the known Kepler exoplanets; Rebecca G. Martin and Mario Livio (2015) ApJ 810, 105 (R), of 287 confirmed exoplanets relative to our eight solar system planets.*

## Our Solar System Is Almost Normal, But Not Quite

*(continued from Page 1)*

Saturn—the least dense world in our solar system—is actually of a fairly typical density for a gas giant world. It turns out that there are many planets out there with Saturn's density or less. The rocky worlds are a little harder to quantify, because our methods and missions are much better at finding higher-mass planets than low-mass ones. Nevertheless, the lowest mass planets found are comparable to Earth and Venus, and range from just as dense to slightly less dense. We also find that we fall right into the middle of the "bell curve" for how old planetary systems are: we're definitely typical in that regard.

But there are a few big surprises, which is to say there are three major ways our solar system is an outlier among the planets we've observed:

- All our solar system's planets are significantly farther out than the average distance for exoplanets around their stars. More than half of the planets we've discovered are closer to their star than Mercury is to ours, which might be a selection effect (closer planets are easier to find), but it might indicate a way our star is unusual: being devoid of very close-in planets.

- All eight of our solar system's planets' orbits are highly circular, with even the eccentric Mars and Mercury only having a few percent deviation from a perfect circle. But most exoplanets have significant eccentricities, which could indicate something unusual about us.
- And finally, one of the most common classes of exoplanet—a super-Earth or mini-Neptune, with 1.5-to-10 times the mass of Earth—is completely missing from our solar system.

Until we develop the technology to probe for lower-mass planets at even greater distances around other star systems, we won't truly know for certain how unusual we really are!

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

## Treasurer's Report November 17, 2015

By Gordon Hansen

### Ford Amateur Astronomy Club Balance Sheet As of November 17, 2015

	Nov 17, 15
<b>ASSETS</b>	
Current Assets	
Checking/Savings	
10000 · Checking	53.72
11000 · FAAC Savings	
11100 · FAAC Club Savings	1,490.70
11200 · Equipment	2,181.70
11300 · Scholarship	316.26
11400 · GLAAC	6,664.37
11000 · FAAC Savings - Other	0.48
<b>Total 11000 · FAAC Savings</b>	<b>10,653.51</b>
12000 · Petty Cash Account	359.89
13000 · CD's	
13100 · CD 200599272	1,062.67
13200 · CD 205196033	1,007.32
13300 · CD 89265268	1,111.11
<b>Total 13000 · CD's</b>	<b>3,181.10</b>
<b>Total Checking/Savings</b>	<b>14,248.22</b>
<b>Total Current Assets</b>	<b>14,248.22</b>
<b>TOTAL ASSETS</b>	<b>14,248.22</b>
<b>LIABILITIES &amp; EQUITY</b>	
Equity	
30000 · Opening Balance Equity	8,890.38
32000 · Retained Earnings	3,797.33
Net Income	1,560.51
<b>Total Equity</b>	<b>14,248.22</b>
<b>TOTAL LIABILITIES &amp; EQUITY</b>	<b>14,248.22</b>

## Meeting Agenda - December 3rd

HFC – Berry Auditorium -Admin. Services & Conference Center [www.fordastronomyclub.com](http://www.fordastronomyclub.com)  
5:30

### Opening/Introduction/Member Observing

#### Main Presentation:

#### Tech Talk:

#### Club Projects/Committees/Member Support

#### Club Business/Secretary/Treasurer/Equipment Reports

## It's Time to Vote

By Greg Ozimek

As a member of the Nominating Committee I would like to invite everyone to consider becoming more involved in our club and running for an office. Our elections are during the January meeting.

All four Board positions are available: president, vice president, secretary, and treasure.

That's it in a nut shell.

If you have any interest please give me a phone call or contact me at:

Webmaster@Fordastronomyclub.com

Greg Ozimek

Nominating Committee

## President's Article

*(continued from Page 2)*

When you consider how long ago anthropologists believe homo-sapiens evolved or how long ago any hominid creatures evolved, you realize that the light from this galaxy left on its journey to Earth when no humans existed and even in the existence of hominid creatures is not certain (hominids are believed to have showed up somewhere between 1 Mly and 4Mly ago.)

And yet due to the warping of space time, time stands still for things traveling "at" the speed of light. So from the point of view of the photon of light... it was simultaneously emitted from it's host-sun and absorbed by our eyes without any time passing at all.

By apparent size (angular dimension), we tend to think of the moon as being the largest object we might see in the night sky. But the Andromeda galaxy is 190 arc-minutes (just over 3°) from edge to edge... more than six times wider than the angular width of the moon. While the moon is about 240,000 miles away (give or take) and that seems "far", Andromeda is 2.5 million light years away — a light year being nearly 6 trillion miles. That's 2.5 million times 6 trillion. That works out to about 1.5 X 10<sup>19</sup> miles (liberally rounded).

Play that thought back through your head very slowly and think about it... an object 2.5 million light years away is so large that it's apparent size in the sky is still just over six times wider than our moon. Only 90 years ago (just before Hubble made his announcement in 1925 — or rather had a friend make the announcement for him — this "nebula" (as it was classified at that time) was believed to be inside our galaxy and only about 35,000 light years away. And honestly... if I had been alive in 1925, I think my money would have been betting on the guys who thought it was only

35,000 light years away. The staggering 1.5 X 10<sup>19</sup> miles distance (and yet still appearing six times wider than the moon in our sky) seems a bit far-fetched to be believable. No wonder Hubble feared ridicule from the rest of the astronomy world.

I posted this image to Google+ (Google+ has quite a few very strong astronomy and astrophotography communities.) One person mentioned how it would be so nice to visit... but for now all we can do is dream.

But that's not really fair, is it? It turns out we can do so much more than just dream. These aren't just pretty things to look at — astronomers and cosmologists can learn so much by studying them. Astronomers and cosmologists have learned much about gravity, solar systems, star formation, star death (in so many possible outcomes), relativity, stellar evolution, stellar nucleosynthesis (without this the periodic table would contain just three elements) by "looking" at objects. More recently, cosmologists have just "noticed" the presence of dark matter and dark energy (whatever those are since they've only just begun to notice that they seem to exist at all — and are still far from understanding what these are.) All this... by looking back in time at objects that we can never hope to visit or touch — at least not for now.

## Membership Dues & Sirius Award Nominations

By Tim Cambell

### Club Membership Dues

Most of us have annual memberships and renew our membership dues at the end of each calendar year. If you've recently joined the club in (or after) September of the year then your membership probably doesn't expire until the end of next year (2016).

But for the rest of us (myself included), it's time to renew our membership dues.

Initial membership is \$30, but renewal is only \$25 provided that you renew before the end of January (after that it goes back to \$30).

You can renew by bringing either cash or check to Gordon Hansen (club treasurer) at the December or January club meeting. You can also mail a check the club's PO Box.

Ford Amateur Astronomy Club

P.O. Box 7527

Dearborn, MI 48121-7527

Thanks to the tireless work of numerous club volunteers, the club keeps our expenses incredibly low and the entire operating budget for the club is derived primarily by our low annual membership dues and the proceeds from the club's springtime Astronomy Conference & Swap event (traditionally that's in March of each year.) These volunteers make it possible to keep our annual membership dues as low as they are.

### Sirius Award Nomination

As I am fond to point out, the club functions primarily due to our numerous volunteers. The club literally has zero paid staff. Every meeting we attend, every speaker presentation we enjoy, the food and drinks, the outreach events, the planetarium... it's all performed by volunteers.

We have volunteers who perform public outreach to our communities and we also have volunteers who perform duties primarily for the club. Each year, the club seeks to provide special recognition

to one such volunteer by presenting them with the club's annual Sirius Award at the annual banquet... and you help us select that volunteer.

As Sirius is the brightest star in the night sky, the Sirius Award is presented to one club member whom the club feels is our "brightest star".

And then there are the technical bits... not just anyone is eligible to receive the award. The award is a "once in a lifetime" achievement and that means that if someone has won this award in the past, then they are not eligible to win it again.

Past winners include:

Bob FitzGerald - 2009

Timothy Dey - 2010

George Korody - 2011

Bob MacFarland - 2012

Don Klaser - 2013

Jim Frisbie - 2014

Doug Bauer - 2015

Also, "current" officers of the club are not eligible to receive the award. The four official club officers review the nominations you submit and then vote for the award winner. To avoid conflicts of interest, the current officers are excluded. This list includes:

Tim Campbell - President

Timothy Dey - Vice President

Ellen Duncan - Secretary

Gordon Hansen - Treasurer

Any other club member is eligible to to receive this time-honored award.

To nominate a member, send an email to [president@fordastronomyclub.com](mailto:president@fordastronomyclub.com). Please include the name(s) of your nominee(s) (since you can nominate more than one person) and also please include (for each nominee) the reasons why you feel this person should receive the award. Your nominations will be forwarded to the vice president, secretary, and treasurer for award consideration. The award will be presented to the 2016 recipient at the annual club banquet in April.

## Astro Imaging SIG

Gordon Hansen

All are invited to join us in the Astro Imaging SIG meetings, to share and discuss images, experiences, and techniques.

We always have a good time, with lively discussion, and sharing of valuable information.

Next meeting is **December 10th**. The meeting room location - HFCC Admin. Services and Conference Center (same building), Berry Amphitheater Auditorium.

Topics invited. Pizza served.

### FAAC Events 2015

**December 3rd - General Meeting - HFC 5:30p**

**December 10th - Astro SIG - HFC 5:30p**

*Background Photo from Lunt Solar Scope Image taken at the Hector J Robinson Observatory, June 28, 2010*

### One FAAC members blog

<http://hjrobservatory.blogspot.com/>

A few updates on the observatory, quick articles and photos. I'll try to improve my writing on this blog. Also, I try to keep daily updates on this blog. - Greg Knekleian, HJRO volunteer.

## Classified

### Dobstuff Telescope For-Sale

with a 16 inch -- 1.5 inch thick -- F4.5 mirror

from a Meade Equatorial Starfinder  
Built in September 2011

6 point all aluminum mirror cell  
2-speed 2-inch Moonlite Focuser  
Destiny curved 3 vane Spider  
3.1 inch Coulter Secondary

This is a Push-To Telescope with Homemade Digital Setting Circles (DSC) using a Tungsten T3 Palm Pilot.

Paperwork, history of mirror, sketches, drawings, etc.

All in a 3-ring binder..

Have over \$2100 invested...Selling for \$1875

Rick Arzadon - N8XI  
6056 Hipp  
Taylor, MI 48180  
email: n8xi@juno.com  
Telephone: 313-561-4839



# FAAC Equip Report 11/20/15

By Dennis Salliotte

<u>Item</u>	<u>Currently Held By:</u>	<u>Date Last Verified</u>
<b>Telescopes</b>		
4" Dobsonian (Harold's donation)	George Korody	1/22/15
<b>Presentation Tools</b>		
Projector (older)	Jim Frisbie	6/30/15
Projection Screen 8'	Bob MacFarland	5/13/15
Speaker System w/wireless mic	Bob MacFarland	5/13/15
Bullhorn	George Korody	1/22/15
DVD Player	Jim Frisbie	1/6/15
Projection Screen 6'	Mike Dolsen	4/23/15
Projector, ViewSonic	Gordon Hansen	11/10/15
<b>Demonstration Tools</b>		
Weight On Planets Scale	George Korody	9/26/15
Lunar Phase Kit	Bob MacFarland	5/13/15
100 ft Scale Model Solar System Kit	Bob MacFarland	5/13/15
<b>Display Items</b>		
Astronomy Event Sign (3' X 6')	Gordon Hansen	5/13/15
PVC Display Board - Folding	Sandra Macika	10/12/15
Banner – Small (24" X 32")	George Korody	1/26/15
Banner – Medium (24" X 72")	George Korody	9/26/15
Banner – Large (32" X 16')	George Korody	9/26/15
Tri-Fold Presentation Boards	Don Klaser	8/12/15
Tri-Fold Poster Board (Early Club Photos)	George Korody	1/22/15
<b>Other</b>		
Canopy (10' X 10')	Tim Campbell	4/2/15
Equipment Etching Tool	Greg Ozimek	4/2/15
Pop Cooler	Michael Dolsen	9/24/15
<b>EQUIPMENT KITS</b>		
<b>Telescopes</b>		
TK3 Celstrn 130 Newt Goto mount	Liam Finn	2/13/15
TK4 Clstrn 90 Refrctr w/man mount	Liam Finn	2/13/15
TK5 4 1/2 " Reflector, on Fitz GEM mount	George Korody	1/22/15
TK6 8" Orion 8XTi Dobsonian	Jennifer Zdanowski; CARETAKERSHIP IS AVAILABLE	9/11/15
TK1 Coronado PST solar scope w/double stack, Meade Autostar Goto mount & tripod and accessories	John McGill	1/22/15
<b>Binoculars</b>		
BK3 15x70 binocs, monopod mount	Bob MacFarland	5/13/15
BK4 20x80 binocs, altaz goto mount	Sandra Macika	2/5/15
BK5 25x70 binocs w/tripod adaptor	Tim Dey	2/13/15

# FAAC Equip Report 11/20/15

By Dennis Salliotte

<b>Item</b>	<b>Currently Held By:</b>	<b>Date Last Verified</b>
<b>Eyepiece Kit</b>		
EPK1 Eyepieces, filters & accesories	Liam Finn	2/13/15
<b>Other</b>		
TA Sky Quality Meter	Syed Saifullah	6/22/15
TA Sky Atlas 2000.0	Tim Dey	2/13/15
TA Orion telescope binoviewer	Liam Finn	2/13/15
<b><u>Lincoln Park Observatory</u></b>		
LPO Celestron binoviewer #93691	Tim Dey	3/16/15
LPO Celestron 2X 1.25" Barlow	Tim Dey	3/16/15
<b>Imaging SIG</b>		
C1 Celestron NexImage Solar System Imager model #93712	Gordon Hansen	5/13/15
C2 Meade Deep Sky Imager PRO III w/AutoStar Suite	Gordon Hansen	5/13/15
C3 Orion StarShoot Deep Space Video Camera NTSC #52185 w/video capture device #52178	Gordon Hansen	3/16/15
C4 Meade Electronic Eyepiece w/cable to a video monitor, VCR or TV. Pairw#43 AND Meade 3.5" LCD Color Monitor Kit # 07700 Complete (unused). Pair w#34	Gordon Hansen	5/13/15
C5 Orion StarShoot Deep Space Video Camera II #52195 AND Orion StarShoot iPhone Control for Deep Space Video Camera II #52195	Gordon Hansen	5/13/15
CA1 Rigel Systems Spectroscope	Gordon Hansen	5/13/15
CA2 Celestron 1.25" to T-Adapter(male thread) Model #93625	Gordon Hansen	5/13/15
CA3 Canon EOS deluxe astrophoto kit FOR Canon bayonet T-thread adapter ans variable 1.25" extender	Gordon Hansen	5/13/15
CA4 Orion StarShoot LCD-DVR #58125 2.5" LCD screen	Gordon Hansen	5/13/15
CA5 Celestron Canon EOS T-ring adapter #93419	Gordon Hansen	5/13/15
<b><u>Special Event Use Only- Not Available For Loan Out</u></b>		
TK2 Meade 8" ETX-LS-ACF w/tripod, voice assist, computerized GPS plus MANY (35+) accessories	Tim Dey	2/13/15
BK1 Orion BT-100 binocular telescope w/hard case, Orion VersaGo h.d. man altaz mount w/Vixen dovetail head and Vixen style binocular holder bracket	Ken Anderson	5/15/15
BK2 Zhumell 25x100 binoculars, hard case & Zhumell TRH-16 tripod w/soft fabric bag	Sandra Macika	2/5/15
Dennis Salliotte equipment@fordastronomyclub.com		

**REMINDER: FAAC membership renewals are due by January 31, 2016.**

Annual – New Member: \$30

Annual – Renewal: \$25 (\$30 after January 31)

Send your check for \$25 to:

FAAC

P.O. Box 7527

Dearborn, MI 48121-7527

Or bring your money to the next FAAC General Meeting at 5:30 PM in the Berry Amphitheater Auditorium in the Administrative Services and Conference Center on the campus of Henry Ford College.

Membership includes the *STAR STUFF* newsletter, discounts on magazines, discounts at selected area equipment retailers, and after-hours access to the Island Lake and Lake Erie Metropark observing sites, use of the FAAC Yahoo Group, and mentoring program.

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