Star Stuff
Ford Amateur Astronomy Club Newsletter
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Is Proxima Centauri's 'Earth-like' planet actually like Earth at all?

By Ethan Siegel

Just 25 years ago, scientists didn't know if any stars—other than our own sun, of course—had planets orbiting around them. Yet they knew with certainty that gravity from massive planets caused the sun to move around our solar system's center of mass. Therefore, they reasoned that other stars would have periodic changes to their motions if they, too, had planets.

This change in motion first led to the detection of planets around pulsars in 1991, thanks to the change in pulsar timing it caused. Then, finally, in 1995 the first exoplanet around a normal star, 51 Pegasi b, was discovered via the "stellar wobble" of its parent star. Since that time, over 3000 exoplanets have been confirmed, most of which were first discovered by NASA's Kepler mission using the transit method. These transits only work if a solar system is fortuitously aligned to our perspective; nevertheless, we now know that planets—even rocky planets at the right distance for liquid water on their surface—are quite common in the Milky Way.

On August 24, 2016, scientists announced that the stellar wobble of Proxima Centauri, the closest star to our sun, indicated the existence of an exoplanet. At just 4.24 light years away, this planet orbits its red dwarf star in just 11 days, with a lower limit to its mass of just 1.3 Earth. If verified, this would bring the number of Earth-like planets found in their star's habitable zones up to 22, with 'Proxima b' being the closest one. Just based on what we've seen so far, if this planet is real and has 130 percent the mass of Earth, we can already infer the following:

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Presidents Article

By Timothy Campbell

A Change for the Club Meeting Time

I've mentioned this casually over the past few months, but now it's starting to become a matter in need of more serious consideration.

Before I get into the options, I'd like to explain a few things.

First… what?

The main option being considered would be to change the start time for the club's monthly general membership meeting from our current start time of 5:30pm to a later start time of 7pm.

Second… why?

Those who work a typical full-time job schedule typically can not make our 5:30pm meeting start times. The start times were intended to be convenient for Ford employee members. But over the years, the membership has shifted and now most Ford employees are retirees. We still have active employees, but we have more retirees in the club. Meanwhile, we have non-employees to consider.

Potential members who are neither retired nor work nearby typically cannot finish their day job and arrive in time for a 5:30pm meeting start time in Dearborn.

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Is Proxima Centauri's 'Earth-like' planet actually like Earth at all?

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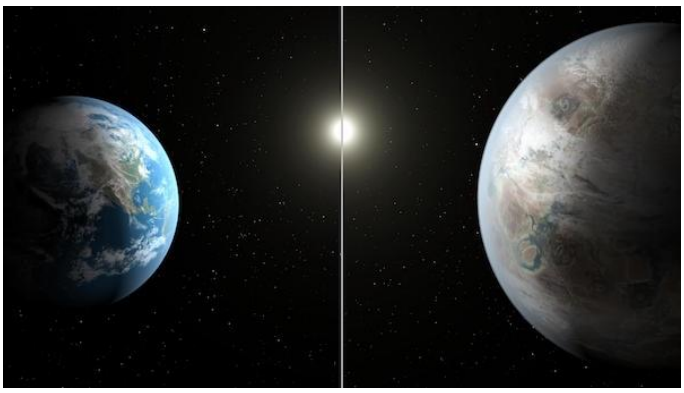
- It receives 70 percent of the sunlight incident on Earth, giving it the right temperature for liquid water on its surface, assuming an Earth-like atmosphere.
- It should have a radius approximately 10 percent larger than our own planet's, assuming it is made of similar elements.
- It is plausible that the planet would be tidally locked to its star, implying a permanent 'light side' and a permanent 'dark side'.
- And if so, then seasons on this world are determined by the orbit's ellipticity, not by axial tilt.

Yet the unknowns are tremendous. Proxima Centauri emits considerably less ultraviolet light than a star like the sun; can life begin without that? Solar flares and winds are much greater around this world; have they stripped away the atmosphere entirely? Is the far side permanently frozen, or do winds allow possible life there? Is the near side baked and barren, leaving only the 'ring' at the edge potentially habitable?

Proxima b is a vastly different world from Earth, and could range anywhere from actually inhabited to completely unsuitable for any form of life. As 30m-class telescopes and the next generation of space observatories come online, we just may find out!



An artist's conception of the exoplanet Kepler-452b (R), a possible candidate for Earth 2.0, as compared with Earth (L). Image credit: NASA/Ames/JPL-Caltech/T. Pyle.

Presidents Article

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Basically, if you don't work nearby, then it's generally not possible to make the meetings… and that means those people generally will not join the club even if they otherwise would be interested in joining.

This has impacted our ability to attract members unless they are either retired or work for Ford.

Third… how?
This decision is too important to be made by the board. A decision at this level should involve a vote of the full club membership.

There is a compelling event driving us to make this decision sooner rather than later.

For those who could not attend his talk, much of what he discussed is in the book "Lessons from the Masters" subtitled "Current Concepts in Astronomical Image Processing" and is edited by Robert Gendler. I say "edited by" because it turns out each chapter is written by a different author (or at least many of them). Fred Espenak wrote a chapter titled "Imaging and Processing Images of the Solar Corona" and this is largely what his afternoon talk was about. So if you missed the talk, you can buy the book.
The nominating committee must have the decision of the club in December so that they can select qualified candidates for the January election. The annual election of officers is the event that compels us to move up the time-table for making this decision.
However, this isn't just about finding qualified candidates to agree to run for office. It was originally about being able to attract members and making the club meetings accessible to a larger audience.

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Presidents Article

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The candidate issue only came to light recently as a result of the officer nominating committee's search efforts.
Our club composition as a high percentage of retirees. In comparison, the Warren club tells me that their membership roster is mostly non-retirees. They also have more active members overall because their club meeting times are more conducive to those who work full-time jobs. In other words, our membership is composed mostly of the people who "can" attend the meetings and does not necessarily reflect of the types of people who would otherwise be interested in joining an astronomy club.

Most social clubs meet in the evenings and tend to have start times of either 7pm or 7:30pm. These start times tend to be popular because they work for most people. Out club is rather unique to have a 5:30pm start time — originally designed for the high percentage of active Ford employees.
I'd like to share the questions being considered:

We are thinking that the 7pm start time is probably the best fit. Feedback from the Warren club is that their meetings begin at 7:30 and they have a long-format meeting with a 30-minute social hour in the middle of the meeting (as opposed to the start or end of the meeting). We have determined that have a social element is extremely popular and should be included.

However, the Warren club does have a relatively late ending time and we are getting some feedback that a late ending time would not be good. Most people seem to prefer that the meeting would end by 9pm … rather than linger into 9:30 or even 10pm (this via informal feedback). So I'm thinking that a 7pm start time would be more desirable than a 7:30pm start time.

The Questions:

(1) You will likely see a question that asks if you would prefer a 5:30pm start time or a 7:00pm start time as one of your choices.

(2) You will also likely see a question asking if either start time precludes you from attending meetings. We are very interested in knowing whether a change of times would have an impact attendance or membership. The hope is that the change will be beneficial for more people rather than the other way round. I'm also keeping in mind that astronomy is probably not a good hobby choice for those who prefer to get to bed early… so hopefully the impact would be negligible but we still want your input.

(3) Another question will likely be around the idea of changing the meeting format. What's that mean?

Currently, we have a 5:30pm start and the meetings run about 2 hours as follows:

- 30 minutes for introductions, observing reports, and "What's up" presentation
- 45-60 minutes for the "main talk" (we prefer to keep this to 45 but are sometimes asked if the speaker can have 60 mins).
- 20 mins for the "tech talk"
- Remaining time for club business… secretary & treasurer reports, events, and announcements.

The "social" time tends to be prior to meeting start or after the meeting ends.

So the option to change the format would likely be to eliminate one talk (there would only be one "main talk" and no tech talk… unless we decided to have a tech talk as the main talk. This would have the side-effect of making it easier to get speakers for the meetings.) This would probably shorten the meeting down to about 1.5 hours from our current 2 hours and allow more time for social interaction.

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Presidents Article

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Since all club members should have an option to participate in the vote (it probably would not be fair to only allow those who can already attend a 5:30 meeting in-person to have a say in the matter) we will likely also solicit votes via email for those who cannot attend meetings (but need to make sure everyone only votes once).

What about pizza?

The idea behind the pizza was that since people were likely coming directly to the meeting without time for food, we'd provide food.

You may have noticed we have donation buckets next to the food and there's a strong likelihood to assume that the donation is for the pizza… the donations are not for the pizza. One donation is for the college scholarship fund (we donate to the college each year… because the college allows us to use their meeting facilities at no cost to us… a fantastic deal. We've looked into the cost of meeting else and it's not cheap (typically about $150-300 to get a room large enough to host our meetings for about 2 hours. BTW, that's per meeting and we have 11 meetings per year!) The second donation bucket is for equipment (the last time we spent significant funds from that account was to replace our very old club projector.) So technically the club pays for the pizza out of our general fund, and the donations go into the scholarship fund and equipment fund so that we don't have to pay for the scholarship or equipment from the general fund. Basically you have a bit more control over how we spend club money but the donations do not go directly to pay for pizza.

The pizza would likely be replaced with snacks. Snacks probably would cost less than the pizza. The club would likely save a small amount of money as a result of this change.

What about those who do work nearby and don't want to commute back home and then return to the meeting?

The Plymouth astrophotography group currently has a group of people who tend to meet at a nearby restaurant (the local "Jimmy John's" sub shop is the favorite) to grab food and socialize before the meeting begins. A similar neighborhood meeting place could be selected for those who work nearby, live farther away, and want to attend the club meeting.

Please attend the October 27th general club meeting for an opportunity to learn more and to ask questions. There will not be a vote at this meeting, but it will be a good opportunity to learn more.

For the Young Astronomers

One way to find a planet

You've heard that Earth revolves around the sun. Well, that's not quite true! Here's what's really going on:

The exact center of all the material (that is, mass) that makes up an object—whether a planet or a pencil—is called its "center of gravity." For example, if you have a straight stick, like a ruler, there's a place in the middle where you can balance it on your finger. That's its center of gravity.

But the center of gravity may not be the point that looks like the middle of the object. Some parts of the object may be heavier (denser) than others. A sledgehammer is heavier on one end than the other. Its center of gravity is much closer to the heavy end than the lighter end.

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For the Young Astronomers

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To get an idea of where the center of gravity is, rest the ends of any object like the ruler or a pencil on one finger from each hand. Slowly move your fingers together without dropping the object. Your fingers will meet underneath the object's center of gravity. You can balance the object on one finger at that special place

The actual center of gravity could be close to the surface if, for example, the object is flat like a ruler or a dinner plate.

Or the center of gravity could be deep inside if the object is "three-dimensional," like a box or a ball. And if you let the object spin (like when you throw it), it will try to spin about that point.

What's a barycenter?

In the case of the Earth and the Sun, both bodies orbit around the very center of the mass (similar to center of gravity) between them. This point is called the "**barycenter**."

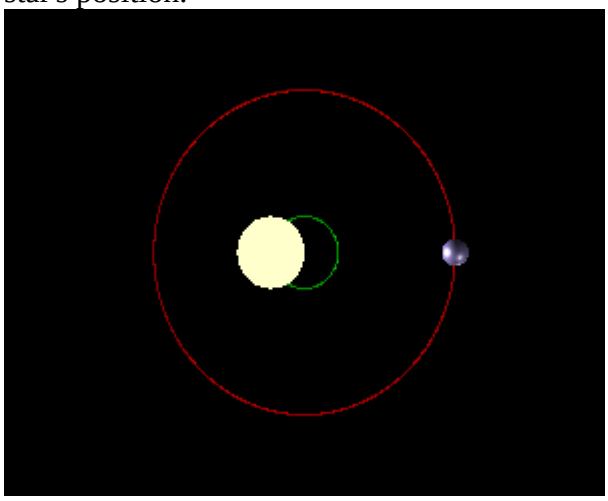
Earth and the Sun are "connected" by the gravity pulling them together. It's just like the light end and heavy end of the sledge hammer. Compared to the size of the Sun, though, Earth is about like a flea on a cat! So the center of mass between the Earth and the Sun is almost—but not quite—the very center of the Sun.

Jupiter, on the other hand, is 318 times as massive as Earth. Therefore, the barycenter of Jupiter and the Sun is a bit further from the Sun's center. So, as Jupiter revolves around the Sun, the Sun itself is actually revolving around this slightly off-center point, located just outside its surface.

Thus, a planet the size of Jupiter will make its star wobble a tiny bit. This picture shows you that the center of mass of a star and the barycenter of a star and a planet can be slightly different points.

The barycenter "wobble" gives us a way to find planets around other stars.

We can take advantage of this bit of knowledge and look for large planets in other solar systems by learning to detect this type of tiny wobble in the star's position.



As seen from above, a large planet orbits a star–or rather the star and planet orbit their shared center of mass or barycenter.

Astro Imaging SIG Events

By Gordon Hansen

It's with a bit of sadness that I announce that the monthly Astrophotography SIG will no longer be held. The SIG started about 10 years ago by George Korody to satisfy the increased interest by club members in astrophotography. Its start coincided with rapid change from film to "CCD's". Over the years, the SIG was chaired by George, Tony Licata, and recently myself. Clay Kessler, Jeff Thrush, John Kirchoff, Jim Frisbie, and others were instrumental in its success.

The major reason for the cancellation is the growth of the Plymouth Astrophotography Club that fulfills the same need. This club meets on the third Tuesday of every month (scheduled confirmed through next spring) and "members" include all the regulars from our SIG and some other very talented astrophotgraphers from the region.

Astro Imaging SIG Events

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In a very real sense, our SIG meeting has been assimilated into the bigger and better Plymouth club.

All are welcome to attend. The meetings are at the Plymouth Library at 6 pm on the third Tuesday of each month. Reminders are published on the club's Yahoo Group.

What's so interesting about Mercury?

By Timothy Campbell

Most of my president's corner articles tend to be about club business… reports of events, and other topics specifically pertaining to the club. But from time to time I like to write an off-topic article. This month, I've given some special attention to Mercury… that small planet near the Sun that doesn't seem to get nearly as much attention as the rest of our planets.

There are several peculiar things about Mercury that differentiate it from the rest of the planets, including one mystery about the planet's strange orbit that appears to violate Newtonian gravity and … a missing planet (more on that later).

First I should point out the surprising number of amateur astronomers who have actually never seen Mercury. Have you actually looked at Mercury (via any "live" method… telescope, binoculars, or even with your unaided eye?) A surprising number of people would answer "no" to that question.
If we spend so much time looking at the Moon, Venus, Mars, Jupiter, and Saturn (I'm just betting you've seen all of those objects), then why not Mercury?

One reason is that Mercury is just so gosh-darned hard to see. You would think that the closest planet to the Sun would be easy to spot. After all, it's got a LOT of sunlight striking its surface. Venus has a lot of light striking it's surface too (or rather its clouds) and it's positively brilliant and so hard to miss that it's actually been phoned in and reported as being a UFO.

It turns out Mercury is surprisingly difficult to spot. Sure it's small… it's the smallest planet of our currently accepted list of 8 official planets. Two moons in our solar system are actually larger… both Jupiter's moon Ganymede and Saturn's moon Titan are larger than Mercury. It's also relatively far away (about twice as far as Venus). It also never strays particular far from the Sun. So "seeing" it requires catching it just after sunset or just before sunrise and… very near the horizon. It also requires that it be near the western or eastern elongation of its orbit. But there's a bigger reason that Mercury is difficult to spot… it's just not very bright.

Every planet has a reflectivity percentage assigned to it which astronomers call "surface albedo". This is the percentage of light that, after striking it's surface, is reflected back into space. Mercury has the lowest surface albedo of any planet… at a mere 8% (.08) Earth's moon is also not very reflective… our moon has roughly the same surface albedo as a worn asphalt road or the black rubber sidewall of an aged tire… it's about 12%. But that's 50% more reflective than Mercury! Venus, in contrast, is closer to 77% (it's MUCH more reflective). Freshly laid asphalt has a surface albedo of 6%. You should be getting the idea by now that the surface of Mercury is a very very dark gray — nearly black surface. This means even when Mercury is in the sky and should be visible, it's still very difficult to spot.

Difficulties aside… it's not as if Mercury were only just recently discovered with the use of the telescope. People have known about the existence of Mercury for thousands of years.

Mercury is also a very fast moving planet. All planets are named for gods of the Roman Pantheon. Mercury is named for the swift-moving messenger god… because of how quickly it moved across the sky relative to any other planets apparent speed. Mercury orbits the sun in just about 88 days.
Speaking of days… it has a strange one.

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What's so interesting about Mercury?

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While Mercury "moves" quickly, its rotation isn't so fast. Mercury's "day" (solar day) is longer than its "year" (about 176 Earth days in 1 Mercury solar day… vs. an 88 day "year").

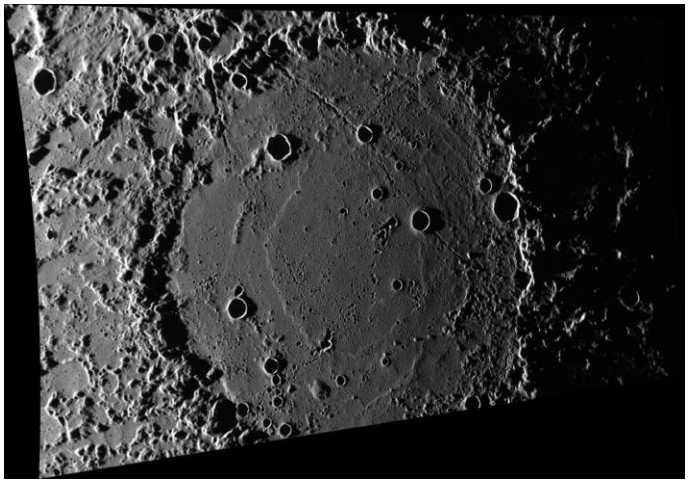
It's true "sidereal" day is about 59 days (shorter than a year) to do a full rotation, but since its orbit around the sun is so fast, when it's sidereal day is combined with it's year, it's "solar day" works out to about 176 Earth days (if you're paying attention to the numbers, one "solar day" on Mercury works out to exactly two "years" on Mercury.

As it rotates so that the side that was previously "away" from the sun is now 180º around… the planet has actually moved most of the way round to the other side of the sun. So it takes a long time to achieve one full "solar" day. (Venus also has an extremely long "solar day" — but not quite as long as Mercury).

Surprisingly, while it is closest to the sun, it is not the hottest planet. That distinction goes to Venus. While Mercury orbits the Sun at an average distance of 36 million miles, Venus orbits the Sun with an average distance of 67 million miles… nearly twice as far. One might expect that Mercury should be much hotter. And while Mercury does get extremely hot… about 700ºK (427ºC or 801ºF), Venus is just a tiny bit hotter… about 735ºK (462ºK / 864ºF). While being nearly twice as close to the Sun means it receives nearly 4x more of the Sun's energy per unit of surface area, having nearly no atmosphere means it cannot retain as much heat. Venus is farther, but it has a very dense atmosphere and a runaway greenhouse gas effect causing it to be hotter.

Mercury is also in the minority category because it has (a) no moon, and (b) no rings. Nearly every other planet has one, or the other, or both (Venus is the other exception).

Mercury is the only planet in the solar system that has no atmosphere. Technically it has something called an "exosphere" (Earth's Moon has an "exposphere"). This means that since there is gravity, it can attract some gas… just not much. So the number of gas molecules in space that tend to hang out nearby aren't zero… there's just not enough of them to have an atmosphere in the way that we traditionally think of an atmosphere (technically an "exosphere" is a kind of "atmosphere"). It's not enough of an atmosphere to be useful for anything (you can't use a parachute to slow your descent or wings to control your flight if you are trying to land there.) Mercury is believed to be geologically dead. Having no atmosphere, and no running surface liquid of any kind means it gets no erosion. It is believed to have no tectonic



activity, no volcanism. It also has protection from any space impactors. This means it has a heavily cratered surface and those craters never wiped away … unless covered over by another impactor that forms a newer crater.

While I'm on the topic of Mercury being believed to be geologically "dead", I should point out another surprise about Mercury… it actually does have a magnetic field. Normally a planet only has a magnetic field if it spins quickly and/or has a molten core. Mercury is so tiny and spins so slowly and is believed to be geologically dead.

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What's so interesting about Mercury?

Continued from page 7

So it was not expected to have a magnetic field… and yet it does. It's core comprises about 75% of it's total mass, is highly metallic, and is believed to have a higher iron content than any other planet — giving Mercury a magnetic field. It is not a very strong magnetic field (the Mariner probe detected that is about 1.1% of the strength of Earth's magnetic field). Unlike Earth's magnetic field, Mercury's field is not aligned with it's poles.

Back to the topic of the surface… having a dark surface, covered in craters, and effectively no atmosphere gives it a surface that looks very much similar to an object more familiar to astronomers… Earth's moon.

If you were to look at an unlabeled photo of Mercury's surface, you could be forgiven for believing that you were looking at a photo of Earth's moon. The unlabeled photo in this article is actually a photograph taken by NASA's Messenger Probe of a piece of Mercury's surface.
But this is not the strangest thing about Mercury… things get much more interesting when you study Mercury's very peculiar orbit.

It has a highly elliptical orbit — more than any other planet (by a wide margin). It is about 50% farther from the Sun at aphelion (.47 AU) than it is at perihelion (.30 AU). But that's not the strangest thing about the orbit.

The stranger thing is that it's orbit resulted in a 200-year-old "mystery" about gravity.

Mercury's orbit appears to violate Newtonian gravity. Mercury's orbit should have been explainable in that in a simple 2-body orbit (Mercury orbiting the Sun to the exclusion of anything else in the solar system) the orbit of Mercury should trace out a simple ellipse (the position of the major axis… from the Perihelion to the Aphelion should not change). Newtonian gravity would also predict that since it isn't really a 2-body orbit (there are other large bodies in the solar system which have an influence) its orbit should be perturbed by these other bodies… and observation confirms that this influence does occur. This causes Mercury to trace out a "spirograph" effect (or a flower petal shape) as the axis precesses around the Sun (in truth this precession is very gradual - it would take 232 centuries for it to precess all the way around the Sun). HOWEVER… Mercury has a greater amount of orbital precession than can be explained by rules of Newtonian gravity alone… even after accounting for the influence of all other bodies in the solar system.
The precession of Mercury's orbit is small… at 5,600 arc-seconds per century. There are 3600 arc-seconds in a degree so that's close to 1.5º per century. But Newtonian gravity (even accounting for all planets) predicts that it should have been 5,557 arc-seconds per century. The small difference of just 43 arc-seconds per century could not be ignored.

The last time a planet went astray was when it was observed that the orbit of Uranus was being perturbed by something… which led to the discovery of Neptune (Neptune's size and position were accurately "predicted" mathematically allowing Neptune to ultimately be discovered.) The credit went to Urbain le Verrier… a French mathematician who specialized in celestial mechanics. His prediction was confirmed in observation by Johann Gottfried Galle (a German astronomer) who confirmed the planet was found within 1º of its predicted location. Now Le Verrier studies the motions of Mercury and discovers that Mercury, like Uranus, also has a "problem" with it's orbit.

As was the case with Uranus, the assumption was that there must be a missing (as yet undiscovered) planet (it worked to explain the Uranus orbit anomaly). The "missing planet" was given the name Vulcan and the search was on for planet Vulcan. But planet Vulcan never showed up. In fact, no object of any kind ever showed up.
The answer turned out to be General Relativity.

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What's so interesting about Mercury?

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Albert Einstein's theory of general relativity predicts that Mercury should precess by 42.98 arc-seconds per century (about 43 arc-seconds when rounded) — which perfectly fits the observed error.

As Mercury draws closer to the sun at Perihelion, gravity is increased and this changes (or "warps") space-time as experienced on Mercury relative to space-time experienced on any other planet.

In other words, from the point of view of Mercury… it is exactly following the rules. From the timeline of an outside observer, it appears to violate the rules and only General Relativity theory sets the record straight.
This confirmation was significant in helping to prove Albert Einstein's theory.

More recently, a shift has also been detected in all of the other rocky planets… although not being as close to the Sun as Mercury and having significantly less-elliptical orbits, the effect is smaller and more difficult to detect, but it does exist.

General Relativity is everywhere. The same math is essential in every GPS navigation device. Without general relativity, the position data would have errors piling up until the GPS position fix is worthless for navigational purposes. The next time you use a GPS to get direction… don't forget to thank Albert Einstein.

…and that's just a few things that make Mercury so interesting!

Try Something New!

By Dennis Salliotte

Are you an expert stargazer? Do you know the sky well enough to point out the brighter constellations to your friends, or to toss out the name of a particularly bright star that someone asks about? If not, would you like to learn to? Have you thought about taking your hobby to the next level while meeting new people who share your interest in astronomy? Why not become one of FAAC's volunteer planetarium presenters? Doing so is a great way to meet new people who are interested in astronomy and to become more familiar with the night sky without clouds, mosquitos or frost. Plus, you don't have to stay up all night to see the whole sky. Just advance the planetarium sky to the part of the sky you are interested in.

If you are already an expert, great! A lot of people are interested in what you know. Here's your chance to share your knowledge with the world. If you're a novice, this is a good way to learn at your own pace. You can have private access to the planetarium to study the sky, practice presenting or to just get comfortable any time it's not being used (a private session under the stars without mosquitoes or frost might make a nice Valentine's Day gift for that special someone ;-)).

If all of this sounds intriguing to you, now is the time to get involved. The Director of Henry Ford College's Hammond Planetarium, Steve Murrell, is now seeking new volunteers to present planetarium shows. Volunteers who are available in the mornings and afternoons during the week are especially needed. The only requirements are that you have an active interest in astronomy and that you reliably show up for any shows that you eventually commit to. You don't have to know the sky extensively. If you have a basic understanding of the motions of the sky, whatever else is needed for a particular show can be learned surprisingly easily (there are a few tricks for that). You do not have to present any shows until you feel you are ready, and after that, you can volunteer for any shows needed that you are interested in and available for. Like everything else in astronomy, it is a little bit challenging at first (just a little) but it's also a lot of fun once you've gotten the hang of it. If you have any questions you can contact Steve Murrell directly, or you can contact me or any of the other FAAC members listed below who are currently active planetarium presenters themselves:

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Try Something New!

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FAAC Active Volunteer Presenters
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Dennis Salliotte dtsalliotte@yahoo.com

Treasurers Report

October 2016

By Gordon Hansen

11:28 AM
10/16/16
Accrual Basis

Ford AmateurAstronomy Club
Balance Sheet
As of October 16, 2016

		Oct 16, 16
ASSETS		
Current Assets		
Checking/Savings		
10000 · Checking	$	167.74
11000 · FAAC Savings		
11100 · FAAC Club Savings	$	1,358.75
11200 · Equipment	$	2,289.48
11300 · Scholarship	$	257.26
Total 11000 · FAAC Savings	$	3,905.49
12000 · Petty Cash Account	$	137.99
13000 · CD's		
13100 · CD 200599272	$	1,064.83
13200 · CD 205196033	$	1,009.37
13300 · CD 89265268	$	1,113.93
Total 13000 · CD's	$	3,188.13
Total Checking/Savings	$	7,399.35
Total Current Assets	$	7,399.35
TOTAL ASSETS	$	7,399.35

FAAC Equipment Holders Report

By Dennis Salliotte

FAAC Equipment Report 10/14/16

Item	Currently Held By:	Date Last Verified
Telescopes		
4" Dobsonian (Harold's donation)	George Korody	1/7/16
Presentation Tools		
Projector (older)	Jim Frisbie	3/22/16
Projection Screen 8'	Bob MacFarland	10/13/16
Speaker System w/wireless mic	Bob MacFarland	10/13/16
Bullhorn	George Korody	1/7/16
DVD Player	Jim Frisbie	3/22/16
Projection Screen 6'	Mike Dolsen	3/1916
Projector, ViewSonic	Gordon Hansen	10/13/16
Demonstration Tools		
Weight On Planets Scale	George Korody	1/7/16
Lunar Phase Kit	Bob MacFarland	10/13/16
100 ft Scale Model Solar System Kit	Bob MacFarland	10/13/16
Display Items		
Astronomy Event Sign (3' X 6')	Gordon Hansen	10/13/16
PVC Display Board - Folding	Sandra Macika	1/8/16
Banner – Small (24" X 32")	George Korody	1/7/16
Banner – Medium (24" X 72")	Sandra Macika	1/8/16
Banner – Large (32" X 16')	George Korody	1/8/16
Tri-Fold Presentation Boards	Don Klaser	9/14/16
Tri-Fold Poster Board (Early Club Photos)	George Korody	1/7/16
Other		
Canopy (10' X 10')	Tim Campbell	10/14/16
Equipment Etching Tool	Greg Ozimek	10/141/10/16
Pop Cooler	Michael Dolsen	6/22/16

EQUIPMENT KITS	CARETAKER	
Telescopes		
TK3 Celstrn 130 Newt Goto mount	Liam Finn	10/13/16
TK4 Clstrn 90 Refrctr w/man mount	Liam Finn	10/13/16
TK5 4 ½ " Reflector, on Fitz GEM mount	Bob MacFarland	10/13/16
TK6 8" Orion 8XTi Dobsonian	Dennis Salliotte CARETAKERSHIP IS AVAILABLE	10/14/16
TK1 Coronado PST solar scope w/double stack, Meade Autostar Goto mount & tripod and accessories	John McGill	1/9/16
Binoculars		
BK3 15x70 binocs, monopod mount	Bob MacFarland	10/13/16
BK4 20x80 binocs,altaz goto mount	Sandra Macika	1/8/16
BK5 25x70 binocs w/tripod adaptor	Tim Dey	9/14/16
Eyepiece Kit		
EPK1 Eyepieces, filters & accessories	Liam Finn	10/13/16
Other		
TA Sky Quality Meter	Syed Saifullah	4/26/16
TA Sky Atlas 2000.0	Tim Dey	9/14/16
TA Orion telescope binoviewer	Liam Finn	10/13/16
Lincoln Park Observatory		
LPO Celestron binoviewer #93691	Tim Dey	9/14/16
LPO Celestron 2X 1.25" Barlow	Tim Dey	9/14/16
Imaging SIG		
C1 Celestron NexImage Solar System Imager model #93712	Gordon Hansen	10/13/16
C2 Meade Deep Sky Imager PRO III w/AutoStar Suite	Gordon Hansen	10/13/16
C3 Orion StarShoot Deep Space Video Camera NTSC #52185 w/video capture device #52178	Gordon Hansen	10/13/16
C4 Meade Electronic Eyepiece w/cable to a video monitor, VCR or TV. Pairw#43 AND Meade	Gordon Hansen	10/13/16

3.5” LCD Color Monitor Kit # 07700 Complete (unused). Pair w#34		
C5 Orion StarShoot Deep Space Video Camera II #52195 AND Orion StarShoot iPhone Control for Deep Space Video Camera II #52195	Gordon Hansen	10/13/16
C6 Canon 60 DA and accessories	Tim Dey	9/14/16
CA2 Celestron 1.25” to T-Adapter(male thread) Model #93625	Gordon Hansen	10/13/16
CA3 Canon EOS deluxe astrophoto kit FOR Canon bayonet T-thread adapter and variable 1.25” extender	Gordon Hansen	10/13/16
CA4 Orion StarShoot LCD-DVR #58125 2.5” LCD screen	Gordon Hansen	10/13/16
CA5 Celestron Canon EOS T-ring adapter #93419	Gordon Hansen	10/13/16
Special Event Use Only-Not Available For Loan Out		
TK2 Meade 8” ETX-LS-ACF w/tripod, voice assist, computerized GPS plus MANY (35+) accessories	Tim Dey	9/14/16
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	7/21/16
BK2 Zhumell 25x100 binoculars, hard case & Zhumell TRH-16 tripod w/soft fabric bag	Sandra Macika	1/8/16
TAK1 Night Vision Intensification binocular unit	George Korody	1/7/16
Dennis Salliotte equipment@fordastronomyclub.com		

STAR STUFF

This Newsletter is published eleven times each year by:
FORD AMATEUR ASTRONOMY CLUB P.O. Box 7527 Dearborn MI 48121-7527

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 .

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 of 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. You may also send email inquiries to 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 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 month's issue.

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