COMING UP AT THE OBSERVATORY....

**FOTO Appreciation Dinner** Dec 5  6p
**FOTOKids** Dec 7  12p
**Astronomy Saturday** Dec 7  7p
**Stonelick Stargaze** Dec 7  Dusk
**Sunday History Tours** Dec 8  1-4p
**Astronomy Thursday** Dec 12  7p
**Luminaria Night!** Dec 15  6:30p
**Astronomy Thursday** Dec 19  7p
**FOTO Meeting** Dec 19  7:30p
**Sunday History Tours** Dec 22  1-4p
**Sunday with the Stars** Dec 22  7p
**Astronomy Thursday** Dec 26  7p
**Stonelick Stargaze** Dec 28  Dusk
**FOTO Member Meeting** Jan 2  7:30p
**FOTOKids @ Wolff Planet.** Jan 3  7p
**Jupiter Night** Jan 4  7-9p
**Dean’s Intro Class** Jan 7, 14 & 21
**Astronomy Thursday** Jan 9  7p
**Astronomy Friday** Jan 10  7p
**Jupiter Night** Jan 11  7-9p
**Dean’s Member Class** Jan 13  7p
**Astronomy Thursday** Jan 16  7p
**Astronomy Friday** Jan 17  7p
**Astronomy Thursday** Jan 23  7p
*Jupiter-King of Planets* Jan 28  7p
**Astronomy Thursday** Jan 30  7p
**Astronomy Friday** Jan 31  7p
* UC Communiversity

**Save-The-Dates**
**Valentine’s Night** Feb 14
**Galileo’s 450th** Feb 15
**Science Expo @ UC** Feb 15

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**THE WORD**

*By Michelle Lierl Gainey*

I am looking forward to seeing many of you at the FOTO Appreciation Dinner on Thursday, December 5th at 6 pm. Happy Holidays to everyone!

The city of Independence has a large holiday celebration planned for Saturday, December 7th and they have invited us to bring telescopes for a star gaze. Scott Gainey is coordinating this event; so far, 12 people have volunteered to come with telescopes. As there could be over one thousand attendees, more volunteers would be very welcome. You could bring a telescope, staff a table at the entry point to direct people and give out COC information, or mingle with the people in line, showing night sky objects on an iPad and chatting with them about astronomy topics.

FOTO is going to build our own Cloud Chamber, like the one UC Physics used to bring for ScopeOut. This is a fascinating device that allows people to view the trails made by cosmic rays as they pass through it. **Aaron Eiben** recently completed his studies with UC Physics and knows how to build a cloud chamber. He will be giving a presentation on this interesting topic at the January FOTO meeting.

The next star party at Stonelick Lake Park will be on Saturday, December 7th. Hopefully the weather will be clear! This dark sky site is a great place to learn how to use your telescope, how to find deep sky objects using a star chart, and to meet fellow astronomy enthusiasts.

The next FOTO meeting will be held on Thursday, January 2 at 7:30 pm. Please note that this might be our LAST Thursday meeting! We will take a vote at the January meeting to propose changing the meeting day to a different day of the week, so as to make the first Thursdays available for public evening programs. We have been conducting a survey to determine which day of the week is best for the most
members, and so far Monday evenings are in the lead. If you have not taken the survey yet, there is still time to state your preferences: just click on this link and take the survey. https://www.surveymonkey.com/s/C7SXJGC

FOTO Appreciation Dinner

By Aashi Mital

It’s that time of year again and you know what that means. Our annual FOTO Appreciation Dinner is just around the corner! The event is being held on Thursday, December 5 at 6 p.m. in lieu of the regularly scheduled monthly membership meeting. We will also be setting up and decorating for the Appreciation Dinner on Wednesday, December 4 at 7 p.m. so any additional help is always welcome. Food and drinks will be provided.

FOTO’s December Meeting

By Dave McBride

The annual FOTO Volunteer Appreciation Dinner will be held in lieu of the regularly scheduled monthly membership meeting on Thursday, December 5th at 6 pm. The dinner will be served at 6:30 pm. Please note the time change from our normal monthly meetings.

In January we will continue our brief series of programs about current activities underway at COC to support Science Education, including the status of our Cloud Chamber project.

Sidewalk Astronomy

By Dean Regas

In November our crews of Sidewalk Astronomers brought telescopes to Newport on the Levee, Brazee Street Studios, Joseph Beth Booksellers, and Washington Park. The sidewalk dates for December will be December 7, 13, and 14. We’re open to suggestions for locations for these – any place that would have a good number of people out and about. If you’re interested in helping (even if you don’t have a telescope) or have some location ideas, please contact Dean Regas dean@cincinnaotobservatory.org

Astronomers Shed More Light on Tycho’s Supernova Remnant

New observations of the famous Tycho’s supernova remnant by the Suzaku X-ray astronomy satellite have revealed that a reverse shock wave racing inward at 1,000 times the speed of sound is heating the remnant and causing it to emit X-ray light.

Also known as SN 1572 or Tycho’s Nova, it was discovered by the Danish astronomer Tycho Brahe in November 1572. When ejecta rammed into surrounding interstellar gas, it created a shock wave – the equivalent of a cosmic ‘sonic boom.’ That shock wave continues to move outward today at about 300 times the speed of sound.

The interaction also created a violent backwash – a reverse shock wave that speeds inward at 1,000 times the speed of sound.

The reverse shock wave is what allows astronomers to see supernova remnants and study them, hundreds of years after the supernova occurred.

The 2014 COC Calendars Are Here!

By Scott Gainey

The 2014 COC Calendars, full of breathtaking images taken by talented astro-photographers who are members of FOTO/COC, are now available in the gift shop. Cost is $15 per calendar, or $10 per calendar if you purchase 10 or more. They make excellent holiday gifts!

Did You Know. . ..

Astronomers started counting Sun spots in 1609.
Highlights of the November FOTO Meeting

By John Barnes

- Aashi Mital announced that the annual Member’s Dinner will be at the December FOTO Meeting, at 6:00 on Thursday, December 5th.
- Fred Calvert, Eric Africa, and Steve Rismiller will conduct a 10-month astrophotography class beginning February, 2014. The class will meet on the third Thursday of each month and is free to FOTO members.
- Scott Gainey offered unbelievable bargains on 2014 COC calendars. I understand there are still a few for sale.
- There was a discussion regarding moving FOTO meetings to a night other than Thursday. There is still time to complete a survey asking which days of the week you can attend. The plan is for members to vote on a new meeting day at the January meeting with the change effective for the February meeting.
- Sidewalk Astronomy is proving to be very popular. See Dean Regas if you would like to volunteer.
- Volunteers are needed for the December 7 Independence, KY Holiday Celebration. See Scott Gainey.

The speakers were Mark Plano Clark and Lee Hite who gave the presentation, "The History and Restoration of the Cincinnati Observatory Time Ball". Work is underway to restore this historic feature to the COC, bringing back the days when residents within sight of the COC could set their clocks to local noon as determined by the COC’s master clock.

Notice of Proposed Change to the FOTO Bylaws:
Change in FOTO Monthly Meeting Day

By Michelle Lierl Gainey

The Observatory staff has requested that FOTO consider changing its monthly meetings to an evening other than Thursday. This would make the Observatory available for public astronomy programs on the first Thursday of the month, as it is on the other Thursdays.

The results to date of the member survey indicate that it will not be a significant problem for most members to switch to a different meeting day; however, the Bylaws as currently written specify that the monthly meeting shall be held on the first Thursday of each month. Thus, it is proposed that the Bylaws be modified as follows:

Article 4 Meetings of Members
Regular Meetings

Current wording:
“Regular FOTO meetings shall be held on the first Thursday of each month at 7:30 p.m. at the principal office of the Friends of the Observatory; they may be changed by the Board in the event of emergencies, to accommodate guest speakers, compensate for hours of sunlight or for special astronomical, educational or organizational events, with “Notice” as provided in Article 11 herein.”

Proposed wording:
“Regular FOTO meetings shall be held once monthly. The day and time will be determined by the FOTO Board, announced in the Newsletter, and can be changed with “Notice” as provided in Article 11 herein.”

A vote will be taken on this proposed change to the Bylaws at the January FOTO meeting. Since Article 11 is mentioned, I am including it below; no change is proposed to Article 11.

Article 11 Notice

“Appropriate Notice” of any meetings conducted by or on behalf of FOTO, shall be via FOTO’s monthly newsletters, telephone, fax, e-mail or postal mail to each eligible voting member of such meeting, stating the purpose, place, day and time of the meeting at least five days before the date of such meeting.

FOTO Kids and FOTO Teens

By Dean Regas

Are you ready for the final FOTO Kids Meeting of 2013? First and foremost, the December meeting has been moved to Saturday, December 7th at 12 pm. Since we shall be meeting in the middle of the day, the topic will be the Sun and the upcoming Winter Solstice. That’s right! It’s getting to be that time of year when the Sun hangs low in the southern sky at high noon, thus giving us shorter days and colder temperatures. Dress for the weather because if it’s clear, we’ll go out to the sundial and set up solar telescopes! We hope to see you there.
Did You Know….

Sandwiched between Jupiter’s atmosphere and a hot rocky core, the interior most likely consists of liquid metallic hydrogen. This highly conductive fluid can exist only under space shuttle crushing conditions like the planet’s 44 million pounds per square inch of pressure.

Search for Distant Galaxies Grows More Intense

Astronomers are using the most advanced telescopes to find the most distant galaxies yet discovered. Now researchers hope to pinpoint the onset of "cosmic dawn,” when starlight from newborn galaxies first bathed the universe.

Scientists are engaged in a fierce competition to bag the most distant galaxies in the cosmos, galaxies that existed less than a billion years after the Big Bang, the colossal explosion that founded the universe.

A new breed of 21st-century hunters is on the chase, their prey bigger than the solar system. [Link to article]

Did You Know….

While the Milky Way is one of the more healthy, star-forming galaxies in the universe, the overall rate of star formation has dropped to a mere 3 percent of its peak amount some 11 billion years ago.

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VP: Aashi Mital
Secretary: John Barnes
Treasurer: JoAnne Pedersen
Trustees
John Blasing (exp. Oct 2015)
Aaron Eiben (exp. Oct 2015)
Al Scheide
Dave McBride

Welcome New & Renewing Members!

William Abner
Mark & Wendy Armstrong
Allysn Austin
Amy and Scott Avera
Michael Averdick
Tricia and Michael Barlow
David A. Blevens
Fred N. Bowman
Eric Brock
John Buonadonna
David E. Burcham
Donald and Carol Campbell
Jay Cavendish
Jason Combs
Jo Ann Coors
Bala Corattiyil
Jean Davison
Linda and John Deatrick
Bob and Mary Fitzpatrick
Heidi Flanders
Devin Flanders
Valeria J Freysinger
Shantinti Gamage
Naomi and Bob Gerwin
Guy Guckenberger
Bruce Holtgren
Chris and Michelene Izor
Dr. Ronald Jandacek
Penelope Kincaid
Tom Klekamp
Jack and Marilyn Krebs

Scott Gainey and Michelle Lierl
Greg & Meshawn Lloyd
Dale and Heather Lombardo
Elissa MacDonald
Mark McGovern
Cindy Mincks
Eitel Monaco
Mihaela Nica
Gary Obst
Cassie and James O’Daniel
George Ostrom
Stephen Ott
Christopher Parrett and Mary
Fitzpatrick
Jenny and David Powell
Louis Prince
Nandakumar Rangan
Greg Ries
Susan and Steve Rismiller
Jeff and Julia Rodriguez
Marc Ross
Bob and Lauren Schroeder
Kenny and Debbie Schroeder
Valerie Scott
John Shepherd
Ronald Gough and Vicki
Shepherd
Miriam Lillian Skapik
Rob Skully
Walter Smothers
Kayla Springer
Dave Sturgis
Thomas and Mary Syzek
Joanne and Bob Tindall
Ann & Mike Ullman
Gary and Diane West
Dean and Marcia Wochner
John Zehler

GROWTH OF Distant Galaxies Grows More Intense

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Bob and Mary Fitzpatrick
Heidi Flanders
Devin Flanders
Valeria J Freysinger
Shantinti Gamage
Naomi and Bob Gerwin
Guy Guckenberger
Bruce Holtgren
Chris and Michelene Izor
Dr. Ronald Jandacek
Penelope Kincaid
Tom Klekamp
Jack and Marilyn Krebs

Scott Gainey and Michelle Lierl
Greg & Meshawn Lloyd
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Elissa MacDonald
Mark McGovern
Cindy Mincks
Eitel Monaco
Mihaela Nica
Gary Obst
Cassie and James O’Daniel
George Ostrom
Stephen Ott
Christopher Parrett and Mary
Fitzpatrick
Jenny and David Powell
Louis Prince
Nandakumar Rangan
Greg Ries
Susan and Steve Rismiller
Jeff and Julia Rodriguez
Marc Ross
Bob and Lauren Schroeder
Kenny and Debbie Schroeder
Valerie Scott
John Shepherd
Ronald Gough and Vicki
Shepherd
Miriam Lillian Skapik
Rob Skully
Walter Smothers
Kayla Springer
Dave Sturgis
Thomas and Mary Syzek
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Craig’s Corner

As 2013 draws to a close I just wanted to take a moment to thank again all our members, volunteers, contributors and staff for all you do to make the Observatory Center the preeminent STEM learning center in Cincinnati.

It has been a year of great progress in all areas of our mission.

Stewardship of both observatory buildings and the telescopes will always be a high priority. Restoration of the Mitchel Building that houses “America’s First Telescope” is drawing to a close. Soon our focus will be back on the 1873 Hannaford designed observatory for exterior woodwork, painting and masonry repairs. It’s a real challenge to first find craftspeople familiar with century old construction techniques and then find openings in our busy program schedule. But it has to be done to keep up this National Historic Landmark.

In addition to garnering respect from area teachers for his K-12 programs, Observatory Outreach Astronomer Dean Regas is recognized more often as co-host of the long-running PBS program Stargazer. Dean is sharing his passion for the wonders of the universe with millions of viewers across the country. And be sure to check out the January issue of Sky & Telescope featuring Dean’s cover story “Jupiter Since Galileo.” Though he left the Observatory this past summer to strike out on his grand adventure, Leo Sack’s innovative programs and interpretative methods are still part of our public, museum and school programming. The Planet Hunters program Leo piloted for the Greater Cincinnati STEM Collaborative is still much sought after by area teachers.

John Ventre, Richard Davis and the members of the history / museum committee have been working for several months now on incorporating into the tours and history programs some of the newly discovered facts that that illuminate the Observatory’s fascinating story.

Building on the success of the Observatory’s STEM (Science, Technology, Engineering and Mathematics) programming we’ll be developing more and more social studies programs for K-12 students and life-long learners.

The Friends of the Observatory volunteers have again served a record number of visitors to the Astro Thursday/Friday programs, Planet Days, the annual ScopeOut Fair, community stargazes, Stonelick State Park viewings and other sidewalk astronomy events. The Observatory simply could not offer the array of programming it does without our special volunteers and all the hours they so generously give! The list goes on and on.

Thanks to your time, talent and treasury the Observatory continues to meet the ever-growing demand for programs and exceed our visitor’s expectations. We know this is a very busy time for all but we hope you’ll take a moment to respond to our recent Year-End Appeal and make an additional investment in your remarkable community treasure.

Happy Holidays to all and we hope to see you at Luminaria Night on the Sunday the 15th!

Terminal Velocity

By Fred Bowman

At the recent “Meet a Meteorite” event at the Observatory there was a discussion concerning the terminal velocity of meteorites.

When Galileo dropped different size cannon balls from the Tower of Pisa (height 52 meters), he found that the different size balls fell at the same rate. Had he substituted a wooden ball of equal mass he would have found that its impact trailed that of the cannon ball by 1/10 second or about three meters.

In a vacuum, all objects fall at the same rate. However, because we have an atmosphere, that atmosphere acts to slow all falling objects differently, according to their mass and cross sectional area. I have calculated the terminal velocities of a 20 kilogram mass for several materials: Aluminum 118.7 m/s (266 mph), Iron 169.6 m/s (379 mph), Gold 228.9 m/s (512 mph) and Wood 83.3 m/s (186 mph).

The simplified formula is: Terminal velocity (m/s) = \sqrt{32.4 \times \text{mass}/A} \ (1/2).
It's hard to believe but it is almost Christmas. Where has the year gone? Looking back at my log of active regions on the solar disk for 2013, there have been 259 as of November 22nd. Most of the time, there have been 5 regions visible in white light telescopes. On November 13th, 5 of the 7 regions were clumped in one area of the sun. AR 1893 was visible for 14 days as compared to AR 1897 for 9 days. However AR 1897 was the most active producing several M and C class flares.

For perspective, that's more Earth-like planets than there are people on Earth.

As for what it says about the odds that there is life somewhere out there, it means "just in our Milky Way galaxy alone, that's 8.8 billion throws of the biological dice," said study co-author Geoff Marcy, a longtime planet hunter from the University of California at Berkeley.

The next step, scientists say, is to look for atmospheres on these planets with powerful space telescopes that have yet to be launched. That would yield further clues to whether any of these planets do, in fact, harbor life.

The findings also raise a blaring question, Marcy said: If we aren't alone, why is "there a deafening silence in our Milky Way galaxy from advanced civilizations?"

In the Milky Way, about 1 in 5 stars that are like our sun in size, color and age have planets that are roughly Earth's size and are in the habitable zone where life-crucial water can be liquid, according to intricate calculations based on four years of observations from NASA's now-crippled Kepler telescope.

Happy Holidays...

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**Is Space Lonely?**

Space is vast, but it may not be so lonely after all: A study finds the Milky Way is teeming with billions of planets that are about the size of Earth, orbit stars just like our sun, and exist in the Goldilocks zone — not too hot and not too cold for life.

Astronomers using NASA data have calculated for the first time that in our galaxy alone, there are at least 8.8 billion stars with Earth-size planets in the habitable zone. For perspective, that's more Earth-like planets than there are people on Earth.

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**UC CommUniversity**

**Enrich Your Life With Quality Courses**

**January 28**

**17th 7-9p**

Jupiter- King of the Gas Planets

**February 4**

**4th 7-9p**

Stargazing 101

**February 17**

**17th 7-9p**

Behind the Scenes

**February 21**

**21st 7-9p**

Dance of the Planets

All classes $22 per person (+ any materials fees.)

To register contact UC CommUniversity at 513-556-6932 or www.uc.edu/ce/commu.html

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**December FOTO Planning Meeting**

By Michelle Gainey

The Board has decided NOT to have a planning meeting in December. Please feel free to e-mail Michelle Lierl Gainey with any comments, questions, or concerns at miler@fuse.net
Sunday With the Stars
By Craig Niemi

Come out and spend a Sunday Night at the Observatory.

December 22nd 7:00-8:30p

Free for Members. Not an Observatory member? Sign up and join the all excitement.

Sunday night Chuck Strubbe will open up one of the Cincinnati Observatory’s large, refracting telescopes for stargazing.

Whether you want to try your own hand on finding celestial objects or prefer Chuck to take you on a guided tour. If cloudy, the night will be open to discussions of any and all astronomical subjects. (Chuck reserves the right to leave after the 1st half hour if no one shows).

Mars Atmospheric Probe Blasts Off Aboard Atlas 5

A United Launch Alliance Atlas 5 rocket dispatched a $671 million gas-sniffing sleuth to Mars on November 20th, taking the first step in a long-distance voyage across the solar system to survey the Martian atmosphere and decipher an enigma nearly as old as the solar system itself.

http://spaceflightnow.com/atlas/av038/131118launch/

Christian Waldschmidt Homestead

I’ve driven past the Homestead on numerous occasions, usually heading to the Little Miami bike path. We had the opportunity recently to tour the site. Restored by the Ohio Society Daughters of the American Revolution, the house, built in 1804 tells a remarkable story of Ohio’s early settlements and Camp Dennison’s role in the Civil War.

www.ohiodar.org/waldhouse.shtml

A2Z Astronomy Class
By Dave Bosse

The A2Z Astronomy class normally takes the month of December off and this year is no different. End of Semester business at the University (i.e. panicky students) and final exams dominate my academic activities at the end of November and early December. With Luminaria Night coming up and comet ISON still holding great promise, there are plenty of goings-on going on.

The A2Z Astronomy class ordinarily meets the second Sunday of each month at 7:00 P.M. in the West Wing of the Herget Building. The group meets for about an hour or so and is free to any member of the Observatory. Give this month a slide and we’ll see you in January with new astronomical topics.

New Star Gazers Report

Did You Know. . ..

Titan’s volcanoes are thought to spew liquid water and organic material, the basics of life.

Meet Me Outdoors

Looking for one site to find this winter’s outdoor recreation events?

Visit the Meet me Outdoors website to find great things to do outdoors, including stargazing (we count indoors under the dome as being outside)
http://meetmeoutdoors.com

“Keep Looking Up”

Ultrafast, ultrabright radio pulses from sources unknown could help map intergalactic matter, but only if astronomers can figure out their origin.

Researchers have detected brief, bright bursts of radio waves washing over Earth from mysterious sources that may be billions of light-years away. The findings could open an entirely new window on the universe by allowing scientists to measure the composition and dynamics of the intergalactic medium—the cold, diffuse plasma that lies between galaxies.

Did You Know. . .

In a few billion years the orbit of Jupiter and Mercury could cross which could throw Mercury into the Sun, into Venus, out of the solar system, or into Earth.

History of the Observatory

December 8th & 22nd 1-4pm

By Craig Niemi

The Minor Planet Center, at the Harvard-Smithsonian Center for Astrophysics, is charged with tracking all asteroids and comets, including Comet ISON.

From 1947 until his retirement in 1978, Paul Herget was the director of the original Minor Planet Center at the Cincinnati Observatory. Drop in anytime between 1-4 pm. $5 per person suggested donation. Free for members. Group tours by appointment. For other Cincinnati Treasures visit “Museums and Historic Sites of Greater Cincinnati”. www.historicgreatercincinnati.org

Laser Bees Could Save Us From Asteroids

The Planetary Society, founded by Carl Sagan and currently headed by Bill Nye, is keeping a sharp eye on the skies. The group has the stated mission to “Create a better future by exploring other worlds and understanding our own.” But they are also looking out for asteroids that might threaten the Earth’s personal space, and they are actively planning out what to do when they find one.

Their mission is simple: avert Armageddon using the best possible research. Scientists have been working on solutions for quite some time now and they released some preview literature of their asteroid-fighting weapons: Laser Bees.

Unfortunately, this does not mean genetically altered bees with laser-beam stingers and the ability to fly through space (though that would be a great SyFy movie plot). It does mean a swarm of small spacecraft equipped with lasers which would blast the incoming asteroid, altering it’s course to a non-Earth-obliterating path.

Artists’ concept of a Broken-up asteroid

Both the technical paper and the poster report on their progress in measuring the zapping of rocks in a vacuum chamber with a high-powered laser. They measure various things like temperature at the spot the laser hits the rock, the development of the hole caused by the laser, the development of the plume of vaporized rock, and the deposition on materials in the chamber.

Comet ISON

Steve Rismiller observed ISON from Milford in the early morning hours of November 18, 2013.

Stargazing at Stonelick State Park

By Craig Niemi

Saturdays – Dec. 7th & 28th

Stargazing begins at dusk. Open to all ages. Bundle up and enjoy crisp clear nights under the stars. Bring your telescope for expert help setting it up and exploring the night sky.

Stargazes are weather permitting. “Friend” the Stonelick Lake Stargazers Facebook page for weather and schedule updates.

Guide to The Planets For Ipad

From tiny Mercury to distant Neptune and Pluto, this interactive guide to the planets from Astronomy Now magazine takes you on a tour of our Solar System and beyond.


Study: 8.8 billion Earth-size, Just-Right Planets

This artist's rendition provided by NASA shows Kepler-69c, a super-Earth-size planet in the habitable zone of a star like our sun, located about 2,700 light-years from Earth in the constellation Cygnus.

Astronomers using NASA data calculate that in our galaxy alone there are at least 8.8 billion Earth-sized planets that are not too hot or not too cold circle stars that are just like our sun, according to a study published Nov. 4, 2013 in the journal Proceedings of the National Academy of Science. For perspective, that's far more Earth-like planets than there are people on Earth.

Scientists they have found 833 new candidate planets with the space telescope, bringing the total of planets they've spotted to 3,538, but most aren't candidates for life.

There are about 200 billion stars in our galaxy, with 40 billion of them like our sun, Marcy said. One of his co-authors put the number of sun-like stars closer to 50 billion, meaning there would be at least 11 billion planets like ours.

Based on the 1-in-5 estimate, the closest Earth-size planet that is in the habitable temperature zone and circles a sun-like star is probably within 70 trillion miles of Earth, Marcy said.