

**Program:** JWST Orbits "Nothing"

**Volume 27, No.10**  
**February 2022**

**Greg Smith – editor.**

**Meeting: February 16, 2022**  
**Hybrid/Zoom meeting 7 Pm**

### **The Moon is Essential.**

I wrote an article for the Columbia Reader newspaper on how important the moon was for the Earth. I had pulled bits and pieces from articles I had read before. This time I came across the following article that put all of those pieces together in one article.

It was a nice find that confirmed what I thought was the importance of the Moon and its size to making Earth a stable place for life to come about and stay around.

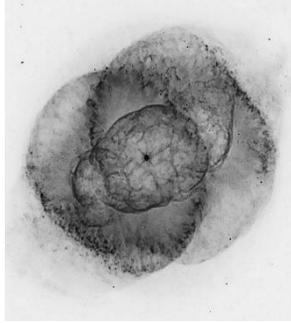
It also seems to now be an important condition for finding life on other exoplanets and something to be watching for when exoplanets are being found.

Can we detect the wobble in an Earth-sized planet that would lead us to surmise that it has a 'large' moon? Would the James Webb Telescope be able to detect that small of a wobble in a planet?

We won't know till we examine some of the exoplanets that are on schedule to be looked at.

How many of you were able to take advantage of the clear nights that we have had recently? I know I was only able to use my binoculars, but I was successful in finding a few objects that I had not seen before from my backyard. I have a small area that is shielded from all my neighbors light pollution. I had not put up my light shield as I did not trust that fog would not roll in as it had a couple of nights before. I was happily surprised to be able to find M35 at the bottom of the eastern foot of Gemini. It was faint but I could make it out. Another surprise was finding M38 in Auriga. It too was faint. I found these because I had used Greg Babcock's book "Star Gazing for Everyone with Binoculars." I will try to find more from my little dark hole in the sky. I may try my light blocking shield on my deck next time. That way I can sit and observe and brace my arms for steadier viewing.

*Every Day is a Star Filled Day,  
Every Night is a Starry Night*



## Moons may yield clues to what makes planets habitable.

University of Rochester

Because the moon is so important to life on Earth, scientists conjecture that a moon may be a potentially beneficial feature in harboring life on other planets. Most planets have moons, but Earth's moon is distinct in that it is large compared to the size of Earth; the moon's radius is larger than a quarter of Earth's radius, a much larger ratio than most moons to their planets. New research finds that distinction significant.

Earth's moon is vitally important in making Earth the planet we know today: the moon controls the length of the day and ocean tides, which affect the biological cycles of lifeforms on our planet. The moon also contributes to Earth's climate by stabilizing Earth's spin axis, offering an ideal environment for life to develop and evolve.

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Miki Nakajima, an assistant professor of earth and environmental sciences at the University of Rochester, finds that distinction significant. And in a new study that she led, published in *Nature Communications*, she and her colleagues at the Tokyo Institute of Technology and the University of Arizona examine moon formations and conclude that only certain types of planets can form moons that are large in respect to their host planets.

"By understanding moon formations, we have a better constraint on what to look for when searching for Earth-like planets," Nakajima says. "We expect that exomoons [moons orbiting planets outside our solar system] should be everywhere, but so far we haven't confirmed any. Our constraints will be helpful for future observations."

### **The origin of Earth's moon**

Many scientists have historically believed Earth's large moon was generated by a collision between proto-Earth -- Earth at its early stages of development -- and a large, Mars-

sized impactor, approximately 4.5 billion years ago. The collision resulted in the formation of a partially vaporized disk around Earth, which eventually formed into the moon.

In order to find out whether other planets can form similarly large moons, Nakajima and her colleagues conducted impact simulations on the computer, with a number of hypothetical Earth-like rocky planets and icy planets of varying masses. They hoped to identify whether the simulated impacts would result in partially vaporized disks, like the disk that formed Earth's moon.

The researchers found that rocky planets larger than six times the mass of Earth (6M) and icy planets larger than one Earth mass (1M) produce fully -- rather than partially -- vaporized disks, and these fully-vaporized disks are not capable of forming fractionally large moons.

"We found that if the planet is too massive, these impacts produce completely vapor disks because impacts between massive planets are generally more energetic than those between small planets," Nakajima says.

After an impact that results in a vaporized disk, over time, the disk cools and liquid moonlets -- a moon's building blocks -- emerge. In a fully-vaporized disk, the growing moonlets in the disk experience strong gas drag from vapor, falling onto the planet very quickly. In contrast, if the disk is only partially vaporized, moonlets do not feel such strong gas drag.

"As a result, we conclude that a completely vapor disk is not capable of forming fractionally large moons," Nakajima says. "Planetary masses need to be smaller than those thresholds we identified in order to produce such moons."

### **The search for Earth-like planets**

The constraints outlined by Nakajima and her colleagues are important for astronomers investigating our universe; researchers have detected thousands of exoplanets and possible exomoons but have yet to definitively spot a moon orbiting a planet outside our solar system.

This research may give them a better idea of where to look.

As Nakajima says: "The exoplanet search has typically been focused on planets larger than six earth masses. We are proposing that instead we should look at smaller planets because they are probably better candidates to host fractionally large moons."

University of Rochester. "Moons may yield clues to what makes planets habitable." ScienceDaily. ScienceDaily, 1 February 2022. <[www.sciencedaily.com/releases/2022/02/220201144027.htm](http://www.sciencedaily.com/releases/2022/02/220201144027.htm)>.

### **Minutes of the January Meeting**

We had a very good turn out with over ten people tuning in to the Zoom meeting. We had several new to us people joining us from RCA in Portland. Steve Powell gave a very detailed presentation on the design and function of the James Webb Space Telescope. His presentation covered the design of the scope and its placement at the L2 gravitational equilibrium point approximately one million miles from Earth opposite from the sun.

☞ **February 2022 Meeting** ☞

**DATE:**        **Wednesday February 16, 2022**

**TIME**        **7 pm**

**PLACE:**     **Hybrid/Zoom** , at your own home or come join us at R .A. Long High School science wing Rm 130

**PROGRAM:** **How the JWST Orbits "Nothing" NASA video**

**The Star Report** is posted on the clubs website: 1. It is listed in the blog portion of the website.

**Moon Phases:**

**Full:** - **Jan. 16, Wed 8:59 AM**    **3<sup>rd</sup> Qtr. :** **Feb 23, Wed 2:34 PM**    **New:** **Mar 2, Wed 09:38 AM**

**1<sup>st</sup> Qtr.** **Mar. 10, Thur. 2:46 AM**

**End of twilight** - when the brightest stars start to come out.

**Wed Feb 16**    6:09 pm

**Mon Feb 28**    6:26 pm

**Mon, March** 7:45 pm

## Friends of Galileo Club Officers

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## Next Month's Newsletter Deadline

The deadline for items in next month's newsletter is:  
**Wednesday: seven days before next meeting.**

**Please feel free to send in your thoughts and experiences about your astronomical adventures.**

Submit your material by E-mail to: [gryth@msn.com](mailto:gryth@msn.com)

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