CENTI ASTRO-SPACE ACTIVITIES

COSMIC DIMENSIONS

March 2022 V. 1 Issue 3

Welcome to the third issue of Cosmic Dimensions. With February coming to an end Spring is not too far behind. With that said I hope everyone is doing well. I have a favor to ask, especially for librarian's receiving this newsletter. Would you share these newsletters with your patrons and friends? I would greatly appreciate it as I am trying to increase my email list in hope of attracting students for my online courses. In this issue the following will be introduced:

SAVE THE DATE - FREE WEBINAR

I will be hosting a free webinar. Notice there are 2 dates listed. On both days the same information will be presented. If one of the dates doesn't work for you hopefully the other date and time will.

DATE: Thursday, March 10th Tuesday, March 15th

TIME: 4:00 PM EST 7:00 PM EST

TOPICS:
- **Networking**
- **Answer questions**
- **Learn about my courses, webinars and workshops.**
- ***Summer STEM SPACE CAMP***
- **Scheduling**

Reservations are required. Call or email me at:

716 - 338 - 7596 **centiastrospace@gmail.com**

Once you have registered, a link will be sent to your email for you to log in.

WHAT'S UP IN THE NIGHT SKY FOR MARCH

Night Sky Notebook

https://www.youtube.com/watch?v=ADlFnq6YZc8

FAMOUS FEMALE ASTRONOMER

Vera Rubin (1928-2016)

Country: USA

Notable discovery: evidence for dark matter

One of the subjects of Vera Rubin's study was the rotation of spiral galaxies. She noticed that the stars in the outermost parts of a galaxy moved as quickly as the stars close to the galaxy's center. This was unusual because, at the time, astronomers thought that the farther a star is from the galaxy's center, the slower its orbital speed. Vera Rubin's observation meant that outer regions of galaxies contained large amounts of unseen matter that held rapidly moving stars in orbit.

As a result, Vera Rubin concluded that about 90% of the mass in the galaxies consists of invisible dark matter. She wasn't the first to propose the concept of dark matter, though — it was introduced earlier by Swiss astronomer Fritz Zwicky but wasn't taken seriously by scientists. Vera Rubin's calculations helped prove that Zwicky's theory was correct.

Objects named in honor of Vera Rubin: asteroid 5726 Rubin, Vera Rubin Ridge on Mars.

Source: Star Walk

NOTABLE FEBRUARY BIRTHDAY'S

Clyde William Tombaugh

(February 4, 1906 – January 17, 1997)

was an American astronomer who discovered Pluto.

The eldest of six children, Clyde Tombaugh was born on a farm near Streator, Illinois. He began helping his father around the farm at an early age, planting corn, threshing oats and wheat, and various other labor-intensive tasks. He loved reading in his spare time, particularly about geography and history. Exploring the world, both in the past and the present, helped make small-town farm life feel a little less small. When Clyde reached his teenage years, however, the world wasn't enough—the thought of what lay beyond it captured his imagination, and astronomy took over as his favorite interest. *Read more at:* https://lowell.edu/who-was-clyde-tombaugh/

Tombaugh stands with one of his homemade telescopes
Unknown (public domain)

Nicolaus Copernicus

Polish: Mikołaj Kopernik, German: Nikolaus Kopernikus,

(February 19, 1473, Toruń, Royal Prussia, Poland - May 24, 1543, Frauenburg, East Prussia [now Frombork, Poland]).

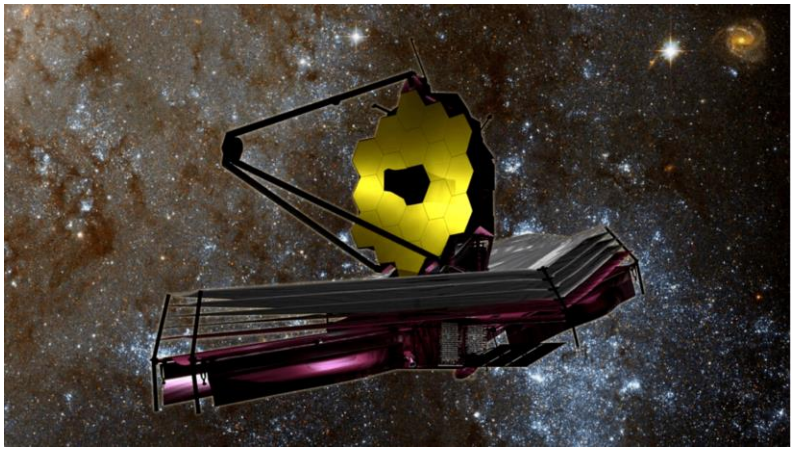
He was the founder of modern astronomy. In Copernicus' lifetime, most people believed that Earth held its place at the center of the universe. The sun, the stars, and all of the planets revolved around it. One of the glaring mathematical problems with this model was that the planets, on occasion, would travel backward across the sky over several nights of observation. Astronomers called this retrograde motion. To account for it, the current model, based on the Greek astronomer and mathematician Ptolemy's view, incorporated a number of circles within circles called epicycles inside of a planet's path. Some planets required as many as seven circles, creating a model many felt was too complicated to have naturally occurred.

In 1514, Copernicus proposed that the center of the universe was not Earth, but that the sun lay near it. He also suggested that Earth's rotation accounted for the rising and setting of the sun, the movement of the stars, and that the cycle of seasons was caused by Earth's revolutions around it. Finally, in 1532, he finished the first manuscript of his book, "De Revolutionibus Orbium Coelestium" ("On the Revolutions of the Heavenly Spheres"), in which he proposed that Earth's motion through space caused the retrograde motion of the planets across the night sky (planets sometimes move in the same directions as stars, slowly across the sky from night to night, but sometimes they move in the opposite, or retrograde, direction).

Although his model wasn't completely correct it did form a strong foundation for future scientists, such as Galileo, to build on and improve humanity's understanding of the motion of heavenly bodies.

5 MOST IMPORTANT DISCOVERIES JWST IS EXPECTED TO MAKE

#1. How are stars and planets formed?



Star systems are formed inside stellar nebulae and are often obscured by dust.

Because of this, the exact dynamics of star system formation are still not well characterized. For example, we are not sure if our solar system is typical or atypical, or why most stars form in groups, according to NASA.

The Webb Telescope should enable us to image the inside of these systems and capture protoplanet and protostar formation.

Determining if our solar system is typical or atypical may also help us better understand our place in the Universe.

#2. What Did the First Galaxies and Stars Look Like?

The first several hundred million years of the Universe's existence are shrouded in mystery.

Our models of how the first stars and galaxies formed, riding the condensation of dark matter halos, are lacking observational data to either confirm or falsify them.

This is because the early Universe is only visible in infrared, requiring a telescope of JWST's scale to image.

Using data collected from these observations, we will be able to answer questions about how the first stars and galaxies formed in the Universe, which will have profound implications for our cosmological models, especially regarding the great mystery of dark matter.

#3. What did the first blackholes look like? And why does every galaxy have a supermassive blackhole at its center?

Every galaxy is known to have a supermassive black hole at its center. But we are still unsure about how exactly these behemoths formed.

Our current theories predict that the first stars may have collapsed to form these giants.

However, we are not sure how they were able to get so big so quickly, forming the incredibly bright quasars that we can still observe *over 13 billion years later*.

The JWST should enable us to peer back and discover their origin story.

#4. Is there another planet like Earth? Can we detect life elsewhere—both in the solar system and beyond?

JWST will enable us to directly image large exoplanets and take spectroscopy readings of many more.

This is important because it enables us to determine the chemical composition of exoplanet atmospheres.

If some of these planets are harboring life, there could be possible biosignatures in the ratios of chemical elements that are different than what is geochemically normal.

It's possible that we will detect these biosignatures of alien life, especially in systems like the nearby TRAPPIST-1. We can also do the same closer to home, turning JWST on the moons of Titan and Europa.

#5. What is the *true* rate of universal expansion?

Recently, cosmologists have found discrepancies in different measurements of the rate of the Universe's expansion.

This discrepancy is known as the "Hubble tension," and it stems from making measurements of the local galaxies and of the cosmic microwave background and comparing notes.

But the precision of local measurements is notably obscured by dust, something that JWST can address.

With newer, more precise measurements, astronomers will learn whether this discrepancy indicates new physics, or is simply measurement error.

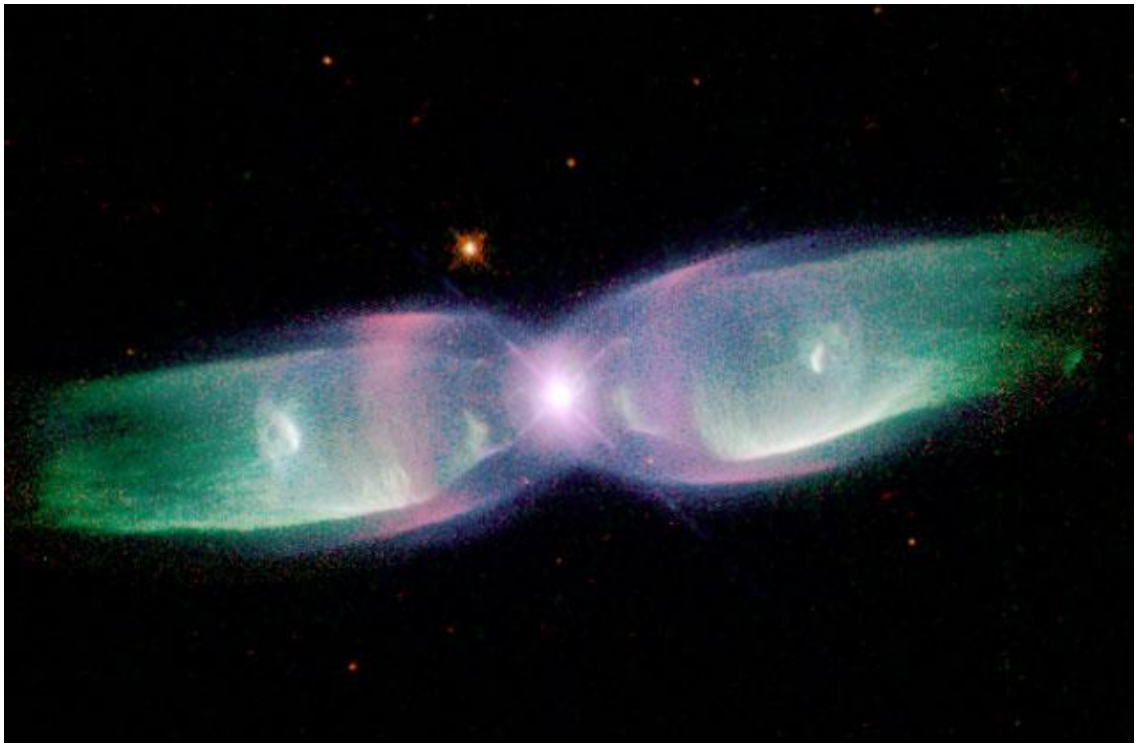
FINAL THOUGHTS: INNOVATION ABOVE *AND* BELOW

The importance of the measurements coming from the JWST for the fields of astronomy and physics can't be understated.

JWST has the potential to completely rewrite our understanding of the Universe—from how galaxies and stars are formed to the structure of planetary systems.

And that's not even mentioning the possible scientific inquiry into signs of alien or intelligent life.

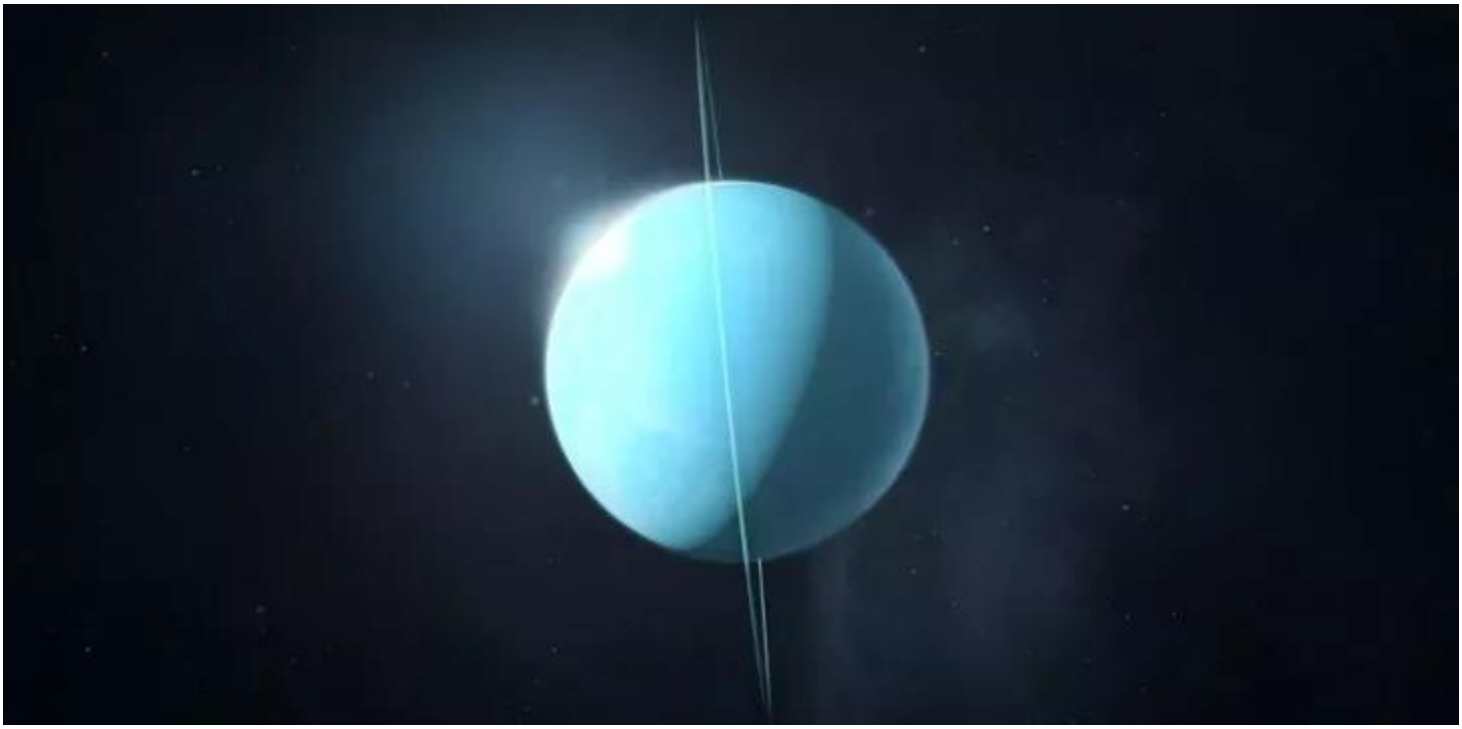
SPACE PIC OF THE MONTH



M2-9: Wings of a Butterfly Nebula
Credit: B. Balick (U. Washington) et al., WFPC2, HST, NASA

COSMIC TIDBITS

If you were to walk around the equator of Pluto it would be the same distance as walking from London to Denver (well, give or take 56 miles).



Because of its unique tilt, a season on Uranus is equivalent to 21 Earth years.

Also the 97.77 degrees tilt on Uranus' axis means that a day there only last 17 hours, 14 minutes and 24 seconds.

EVENTS IN HISTORY

1781 March 13: Uranus discovered by Sir William Herschel, British Royal Astronomer (1738-1822).

1926 March 16: Dr. Robert H. Goddard launched the first liquid-propelled rocket at 2:30 p.m. on a farm in Auburn, MA outside Worcester, MA

1965 March 18: While tethered to his spacecraft, cosmonaut Alexi Leonov became the first man to walk in space.

1965 June 3: Astronaut Ed White became the first American to walk in space.

1965 July 14: The spacecraft Mariner 4 transmitted the first pictures of Mars.

BENEFITS OF SPACE EXPORATION

CMOS Sensors Enable Phone Cameras, HD Video

NASA Technology **Originally published in 2017**

"People told me, 'You're an idiot to work on this,'" Eric Fossum recalls of his early experiments with what was at the time an alternate form of digital image sensor at NASA's Jet Propulsion Laboratory. (JPL).

His invention of the complementary metal oxide semiconductor (CMOS) image sensor would go on to become the Space Agency's single most ubiquitous spinoff technology, dominating the digital imaging industries and enabling cell phone cameras, high-definition video, and social media as we know it. Read more at: https://spinoff.nasa.gov/Spinoff2017/cg_1.html

ASTROSPACE JOKE of the MONTH

What was the first animal into space? ***The cow that jumped over the moon...***

SPACE QUOTE OF THE MONTH

"Two possibilities exist: either we are alone in the Universe, or we are not. Both are equally terrifying." -- Sir Arthur C. Clarke

INSPIRATIONAL QUOTE OF THE MONTH

We Learn . . .

10% of what we read

20% of what we hear

30% of what we see

50% of what we see and hear

70% of what we discuss

80% of what we experience

95% of what we teach to others

-- William Glasser

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