STRATFORD ASTRONOMY GROUP

NOVEMBER 5TH, 2024

AGENDA

- Meet and Greet
- Club NEWS and Activities
- Club Q & A
- Equipment Lessons
- Software and Imaging Information
- Latest Astronomy NEWS
- What’s UP this Month
- Show and Tell
- Astronomy Lessons / Talks
- Cosmology Lessons
- Conclusion

MEET AND GREET

Welcome

New Visitors

Regrets

PREVIOUS MEETING REVIEW

Meeting attended by :

Paul Bartlett
Jim Nafziger
Richard Skevington
Bill Thompson
Ken Roberts
Mike Marancer
Mary Montizambert
Patrick Hayes
Peter Tinits
Brent Pollock
Wolfgang Keller
Bob Greer
Anne-Marie Lappano
Bruce Simpson
Michael Burns

UPCOMING MEETINGS

NEXT MEETING DATES

Date	Room	Location
~~Sept 17th, 2024~~	~~104~~	~~St. Michael's~~
~~Oct 1st, 2024~~	~~104~~	~~St. Michael's~~
~~Nov 5th, 2024~~	~~104~~	~~St. Michael's~~
Dec 3rd, 2024	104	St. Michael's
Jan 7th, 2025	104	St. Michael's
Feb 4th, 2025	104	St. Michael's
March 4th, 2025	104	St. Michael's
April 1st, 2025	104	St. Michael's
May 6th, 2025	104	St. Michael's
June 3rd, 2025	104	St. Michael's

CLUB NEWS AND ACTIVITIES

Group Funds

Total = $808.30

- If you would like to contribute to the group, then please e-transfer Tim at:

timannemariepauli@gmail.com

or by cheques:

Tim Pauli

96 Front Street

Stratford, ON

N5A4H2

CLUB NEWS AND ACTIVITIES

EQUIPMENT:

STRATFORD ASTRONOMY CLUB EQUIPMENT

CLUB EQUIPMENT LOCATION:

Paul Bartlett is now storing all the group's equipment. If you wish to borrow an item, then please contact him at:

1948paul.bartlett@gmail.com

519-274-2010

New Equipment Donation: Tim

CLUB NEWS AND ACTIVITIES

- New Web site: (https://stratfordastronomy.com/)
  Tim Pauli - Owner/Administrator
  Ken Roberts - technical contact
  Tom Kimber - Administrator/Editor
  Doug Fyfe - Administrator
  Michael Burns- Administrator
  Tom will build it on WordPress.

CLUB Q & A

WHAT'S UP

STRATFORD ASTRONOMY GROUP

WHAT'S UP FOR NOVEMBER

HEY, THERE BE A MOON OVERHEAD

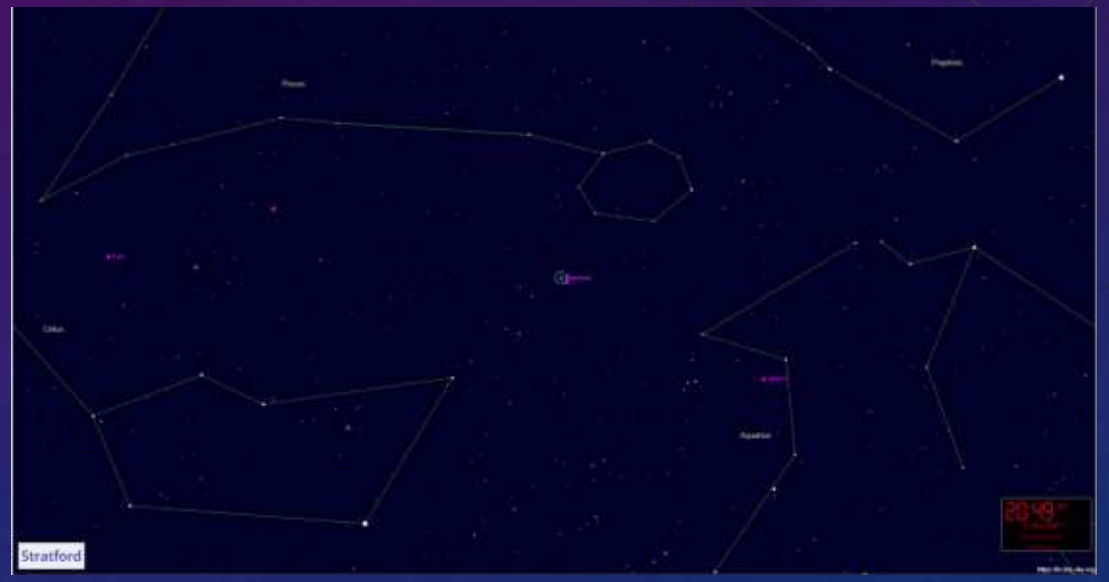
MOON PHASES FOR THE MONTH OF NOVEMBER

« November 2024 (Let's use the Moon) »

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1 New Moon	2
3 Conjunction of the Moon and Mercury The Moon at perihelion Lunar occultation of Antares	4 Close approach of the Moon and Venus Conjunction of the Moon and Venus	5	6	7	8	9 Moon at First Quarter
10 Close approach of the Moon and Saturn Lunar occultation of Saturn Conjunction of the Moon and Saturn	11 Lunar occultation of Neptune	12 Northern Taurid meteor shower 2024	13 Asteroid 11 Parthenope at opposition	14 The Moon at aphelion The Moon at perigee	15 Saturn ends retrograde motion Full Moon	16 Close approach of the Moon and M45 Mercury at greatest elongation east Uranus at opposition
17 Leonid meteor shower 2024 Close approach of the Moon and Jupiter Conjunction of the Moon and Jupiter Lunar occultation of Beta Tauri The Pleiades cluster is well placed	18	19	20 Conjunction of the Moon and Mars Close approach of the Moon and Mars Mercury at dichotomy	21 Mercury at highest altitude in evening sky α-Monocerotid meteor shower 2024	22 Moon at Last Quarter	23
24	25	26 The Moon at apogee	27 Lunar occultation of Spica The Hyades cluster is well placed	28 November Orionid meteor shower 2024	29 Comet 333P/LINEAR passes perihelion	30

Lunar occultation of Neptune

This event is visible through a four-inch telescope from Stratford.
Mon, 11 Nov 2024 from 19:02 EST (00:02 UTC) to 22:48 EST (03:48 UTC)



The Moon will pass in front of Neptune, creating a lunar occultation visible from countries and territories including eastern Canada, the Contiguous United States, Greenland and Mexico amongst others. Although the occultation will only be visible across part of the world – because the Moon is so close to the Earth that its position in the sky varies by as much as two degrees across the world – a close conjunction between the pair will be more widely visible.

The occultation will be visible from Stratford. It will begin with the disappearance of Neptune behind the Moon at 21:06 EST in the southern sky at an altitude of 44.0 degrees. Its reappearance will be visible at 22:21 EST at an altitude of 39.6 degrees.

THE SKY ON 11 NOVEMBER 2024

Sunrise 07:10
Sunset 17:02
Twilight ends 18:40
Twilight begins 05:31

Waxing Gibbous
84%
10 days old

Planets

	Rise	Culm.	Set
Mercury	09:15	13:35	17:56
Venus	10:39	14:56	19:12
Moon	14:54	20:46	02:52
Mars	21:47	05:18	12:48
Jupiter	18:38	02:13	09:48
Saturn	14:26	19:55	01:24

All times shown in EST.

Close approach of the Moon and M45

This event is visible to the naked eye from Stratford.
Sat, 16 Nov 2024 at 02:40 EST (07:40 UTC)

The Moon and M45 will make a close approach, passing within a mere 8.1 arcminutes of each other. The Moon will be 15 days old.

From Stratford , the pair will be visible in the morning sky, becoming accessible around 18:06, when they reach an altitude of 12° above your eastern horizon. They will then reach their highest point in the sky at 00:28, 70° above your southern horizon. They will be lost to dawn twilight around 06:30, 15° above your western horizon.

The Moon will be at mag -12.8; and M45 will be at mag 1.3. Both objects will lie in the constellation Taurus.

They will be close enough to fit within the field of view of a telescope, but will also be visible to the naked eye or through a pair of binoculars.

THE SKY ON 16 NOVEMBER 2024

Sunrise 07:16
Sunset 16:57
Twilight ends 18:37
Twilight begins 05:36

Waning Gibbous
98%
15 days old

Planets

	Rise	Culm.	Set
Mercury	09:23	13:40	17:57
Venus	10:46	15:02	19:19
Moon	16:37	00:21	08:19
Mars	21:34	05:04	12:34
Jupiter	18:16	01:51	09:25
Saturn	14:06	19:35	01:04

All times shown in EST.

Lunar occultation of Spica

This event is easily visible through standard binoculars from Stratford.
Wed, 27 Nov 2024 from 05:28 EST (10:28 UTC) to 09:50 EST (14:50 UTC)

SkyX

The occultation will be visible from Stratford. It will begin with the disappearance of Spica (Alpha Virginis) behind the Moon at 05:33 EST in the south-eastern sky at an altitude of 14.8 degrees. Its reappearance will be visible at 06:46 EST at an altitude of 25.1 degrees.

The Moon will pass in front of Spica (Alpha Virginis), creating a lunar occultation visible from the Contiguous United States, eastern Canada and north-western Bahamas. Although the occultation will only be visible across part of the world – because the Moon is so close to the Earth that its position in the sky varies by as much as two degrees across the world – a close conjunction between the pair will be more widely visible.

THE SKY ON 27 NOVEMBER 2024

Sunrise 07:30
Sunset 16:49
Twilight ends 18:31
Twilight begins 05:48

Waning Crescent
9%
26 days old

Planets

	Rise	Culm.	Set
Mercury	08:58	13:20	17:42
Venus	10:55	15:16	19:37
Moon	03:58	09:24	14:40
Mars	20:59	04:29	11:59
Jupiter	17:28	01:02	08:36
Saturn	13:23	18:52	00:22

All times shown in EST.

Shower Time

SUN, 17 NOV 2024

Seen from Stratford , the shower will not be visible before around 23:10 each night, when its radiant point rises above your eastern horizon. It will then remain active until dawn breaks around 06:46

At its peak, the shower is expected to produce a nominal rate of around 15 meteors per hour (ZHR). However, this *zenithal hourly rate* is calculated assuming a perfectly dark sky and that the radiant of the shower is situated directly overhead.

THU, 28 NOV 2024

Seen from Stratford , the shower will not be visible before around 18:50 each night, when its radiant point rises above your eastern horizon. It will then remain active until dawn breaks around 06:59.

The shower is likely producing its best displays in the hours around 02:00 EST, when its radiant point is highest in the sky.

At its peak, the shower is expected to produce a nominal rate of around 3 meteors per hour (ZHR).

LATEST ASTRONOMY NEWS

NOVEMBER

C/2023 A3 (Tsuchinshan-ATLAS)—or just 2023 A3

GRAVITATIONAL LENS CONFIRMS THE HUBBLE TENSION – OCT 4TH

We've known the universe is expanding for a long time. The first solid paper demonstrating cosmic expansion was published by Edwin Hubble in 1929,

•Because of this, the rate of cosmic expansion is known as the Hubble constant, or Hubble parameter, H_0. From this parameter, you can calculate things such as the age of the universe since the Big Bang, so knowing the value of H_0 is central to our understanding of modern cosmology.

•All of these were based on the cosmic distance ladder, which uses a series of observations to calculate ever greater cosmic distances, each building on the previous method. But in the past few decades we got pretty good at it, and the Hubble value seemed to settle around 70 (km/s)/Mpc. After that, things started to get…problematic.

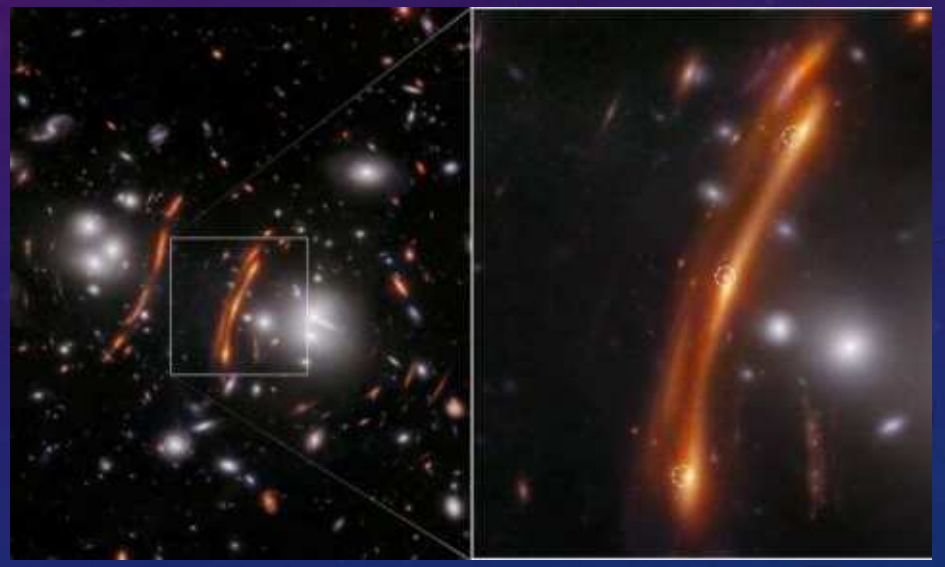
•With satellites such as WMAP and Planck we started to get high-resolution maps of the cosmic microwave background. From fluctuations in this background we have a new way to measure H_0 and get a value of 67–68 (km/s)/Mpc. At the same time, observations of distant supernovae and the cosmic distance ladder pin down the value to 73–75 (km/s)/Mpc.

Both methods are quite precise, and yet they entirely disagree. This disagreement is now known as the Hubble tension problem, and it is the most bothersome mystery in cosmology.

We aren't sure what causes the Hubble tension. It might mean that one or more of our observation methods are fundamentally flawed, or it might mean there is something about dark energy and cosmic expansion that we really don't understand.

But astronomers generally agree that one way to address this mystery is to look for ways to measure H_0 that are independent of both the cosmic background and the cosmic distance ladder.

One such method involves gravitational lensing used by professional astronomers



The study is based on JWST images of a Type Ia supernova named SN H0pe.
The team calculated H_0 to be 70–83 (km/s)/Mpc.

EVENT HORIZON: AFTER PHOTOGRAPHING BLACK HOLES, WE ARE NOW MAKING A MOVIE – OCT 11

In 2019, using its global network, the EHT produced an image of the black hole at the center of M87, a galaxy 54 million lightyears away from Earth.

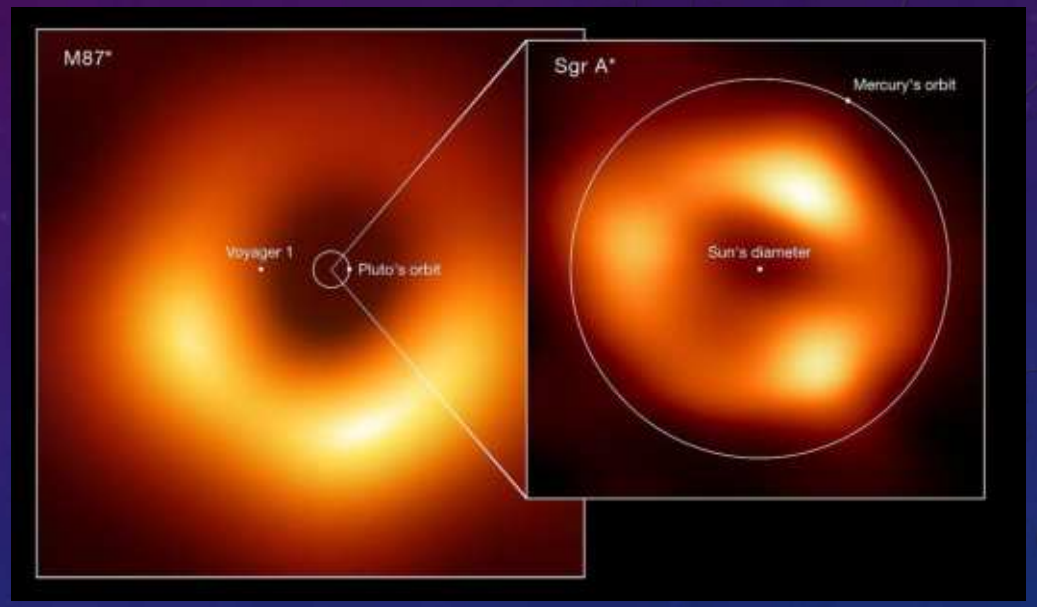
It was the first view of the 'shadow' of a black hole, the dark spot that denotes its 'event horizon," the boundary beyond which nothing—matter, energy, or even light—can escape its gravitational pull.

The EHT followed up with an image of Sagittarius A*, a black hole at the center of our Milky Way galaxy, in 2022.

Now Falcke and a team of British, Dutch, Finnish and Namibian astronomers in BlackHolistic, together with the EHT, will film a landmark video of black holes.

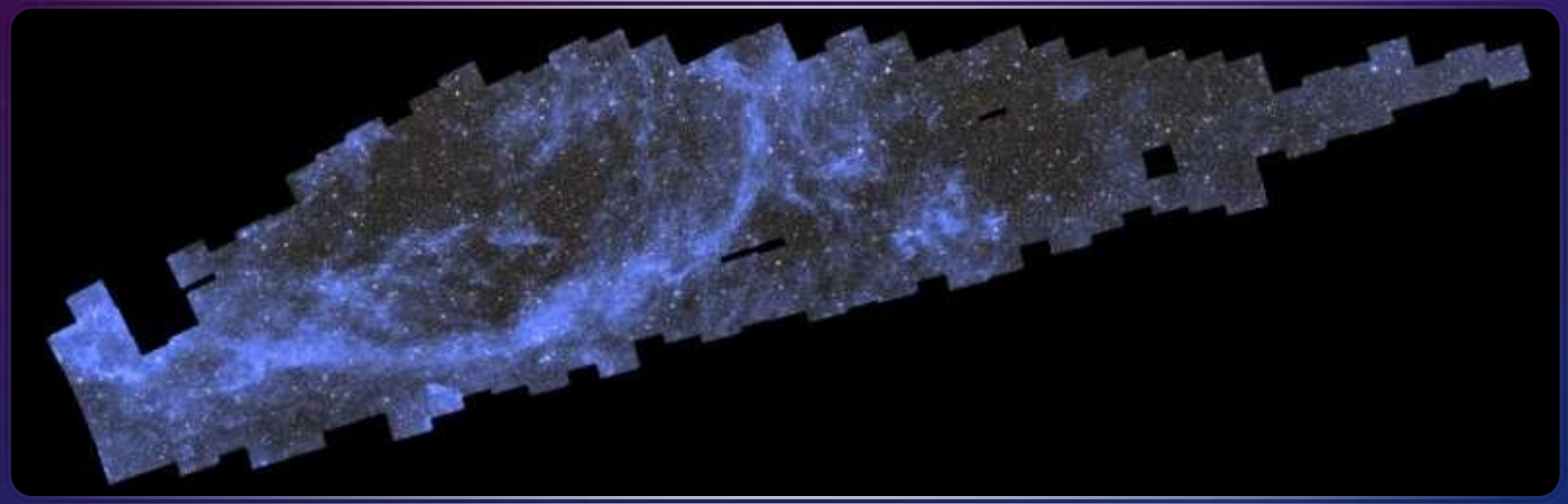
With the help of a new 15-meter-wide telescope in Namibia called the Africa Millimeter Telescope (AMT), the goal is to produce hours-long videos of the swirling plasma and gas around the event horizons of M87 and Sagittarius A*.

"We made the first picture of a black hole. Now we want to take it a step further. We want to make the first movie of a black hole," Falcke said.



Lia Medeiros release a PRincipal-component Interferometric MOdelin (PRIMO) image of M87*

ZOOM INTO THE FIRST PAGE OF ESA EUCLID'S GREAT COSMIC ATLAS – OCT 16

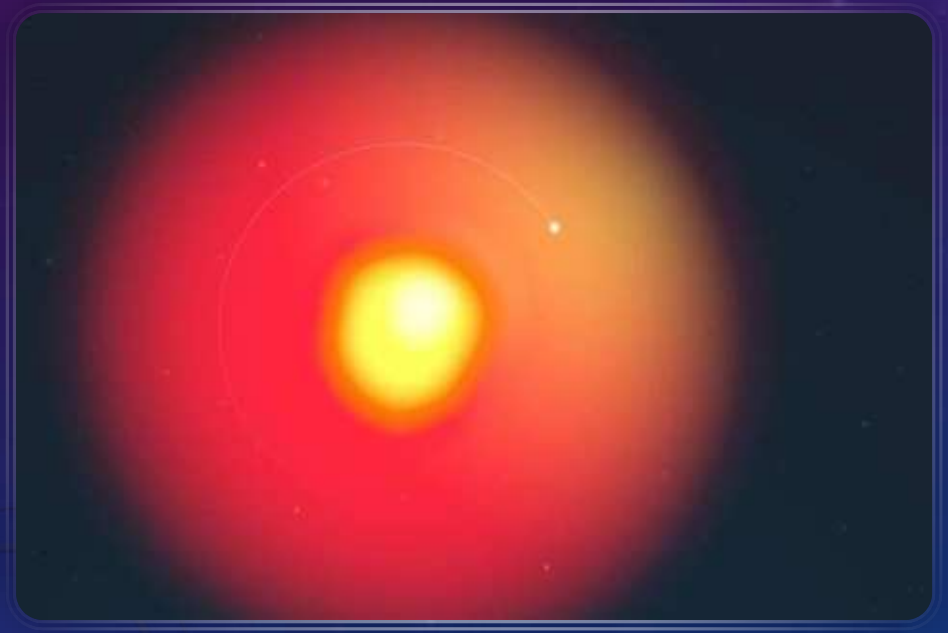


•On 15 October 2024, ESA's Euclid space mission revealed the first piece of its great map of the universe, showing millions of stars and galaxies.

•This first chunk of the map, which is a huge mosaic of 208 gigapixels, was revealed at the International Astronautical Congress in Milan, Italy

•The mosaic contains 260 observations made between 25 March and 8 April 2024. In just two weeks, Euclid covered 132 square degrees of the Southern Sky in pristine detail, more than 500 times the area of the full moon.

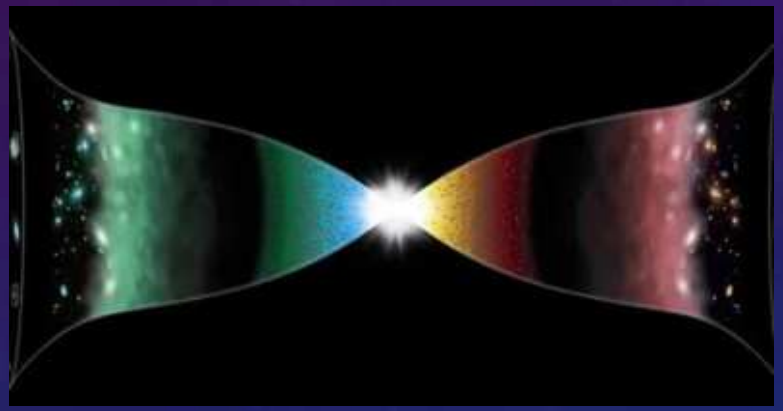
BETELGEUSE, BETELGEUSE, BETELGEUSE! BRIGHT STAR BETELGEUSE LIKELY HAS A 'BETELBUDDY' STELLAR COMPANION, SO NOT LIKELY ON THE BRINK OF EXPLODING– OCT 21



- One of the brightest stars in the night sky, Betelgeuse, may not be on the brink of exploding as a supernova, according to a new study of the star's brightening and dimming. Instead, recent research shows that the observed pulsing of the starlight is probably caused by an unseen companion star orbiting Betelgeuse.
- Formally named Alpha Ori B, the "Betelbuddy" (as astrophysicist Jared Goldberg calls it) acts like a snowplow as it orbits Betelgeuse, pushing light-blocking dust out of the way and temporarily making Betelgeuse seem brighter. Goldberg and his colleagues present their simulations of this process in a paper accepted for publication in *The Astrophysical Journal*. The findings are published on the *arXiv* preprint server.
- "We ruled out every intrinsic source of variability that we could think of as to why the brightening and dimming was happening in this way," says Goldberg, the study's lead author and a Flatiron research fellow at the Flatiron Institute's Center for Computational Astrophysics. "The only hypothesis that seemed to fit is that Betelgeuse has a companion."

'Cosmic inflation:' did the early cosmos balloon in size? A mirror universe going backwards in time may be a simpler explanation – Nov 3

Neil Turok is the Higgs Chair of Theoretical Physics at the University of Edinburgh.



According to string theory, the basic building blocks of the universe are miniscule, vibrating loops and pieces of sub-atomic string. As currently understood, the theory only works if there are more dimensions of space than the reversed, we experience. So, string theorists assume that the reason we don't detect them is that they are tiny and curled up.

Unfortunately, this makes string theory hard to test, since there are an almost unimaginable number of ways in which the small dimensions can be curled up, with each giving a different set of physical laws in the remaining, large dimensions.

Meanwhile, cosmic inflation is a scenario proposed in the 1980s to explain why the universe is so smooth and flat on the largest scales we can see. The idea is that the infant universe was small and lumpy, but an extreme burst of ultra-rapid expansion blew it up vastly in size, smoothing it out and flattening it to be consistent with what we see today (in 10^{-33} seconds grew 10^{78} times its size). Recently, my colleague Latham Boyle and I have tried to build simpler and more testable theories that do away with inflation and string theory. Taking our cue from the observations, we have attempted to tackle some of the most profound cosmic puzzles with a bare minimum of theoretical assumptions.

Our first attempts succeeded beyond our most optimistic hopes. Time will tell whether they survive further scrutiny. However, the progress we have already made convinces me that, in all likelihood, there *are* alternatives to the standard orthodoxy – which has become a straitjacket we need to break out of.

I hope our experience encourages others, especially younger researchers, to explore novel approaches guided strongly by the simplicity of the observations – and to be more skeptical about their elders' preconceptions. Ultimately, we must learn from the universe and adapt our theories to it rather than vice versa.

Picturing the big bang as a mirror neatly explains many features of the universe which might otherwise appear to conflict with the most basic laws of physics. For example, for every physical process, quantum theory allows a "mirror" process in which space is inverted, time is reversed and every particle is replaced with its anti-particle (a particle similar to it in almost all respects, but with the opposite electric charge).

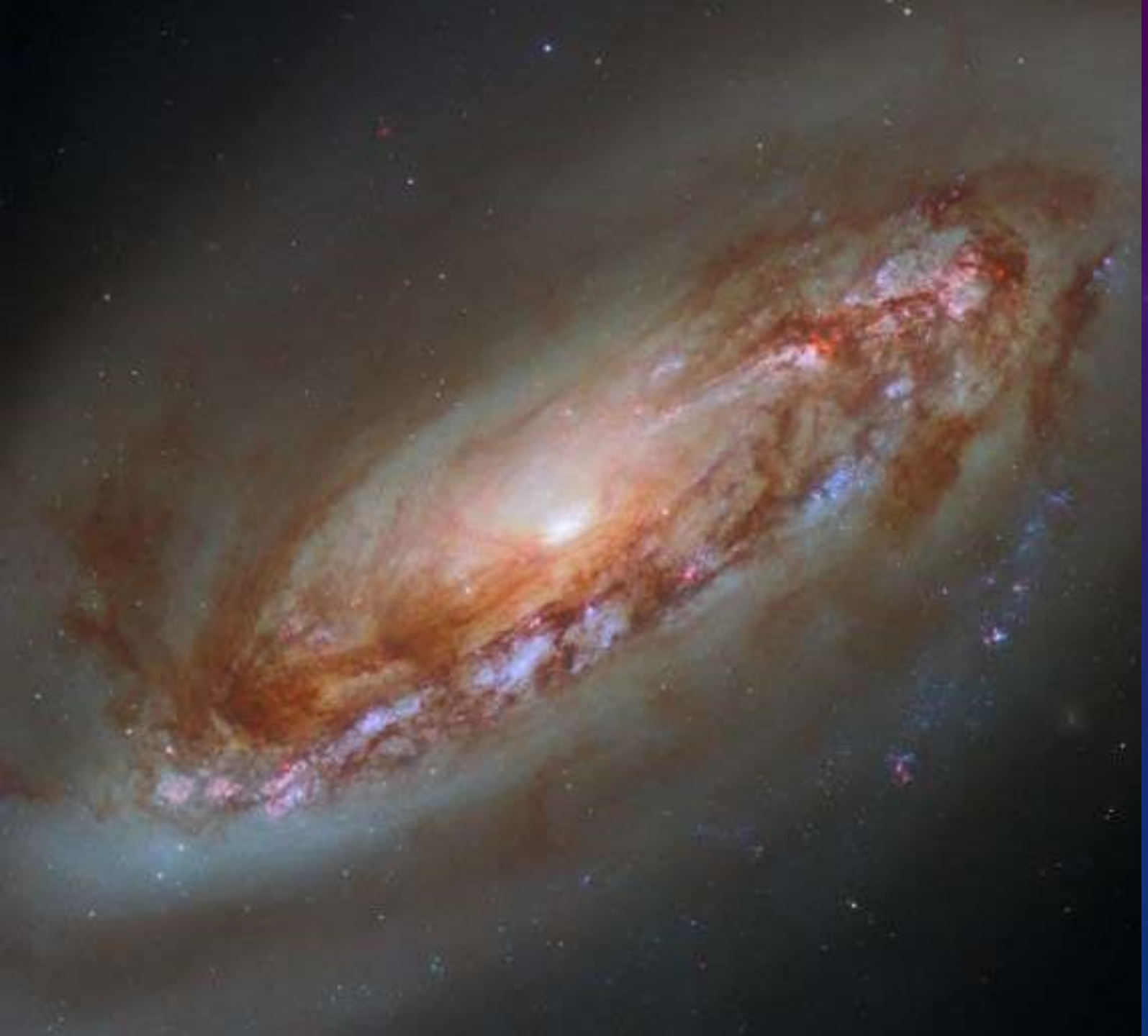
LATEST WEBB/HUBBLE IMAGES

Hubble captures spiral galaxy NGC 5248 – OCT 14

The sparkling scene depicted in this NASA/ESA Hubble Space Telescope image is of the spiral galaxy NGC 5248, located 42 million light-years from Earth in the constellation Boötes. It is also known as Caldwell 45. The Caldwell catalog holds visually interesting celestial objects that are not as commonly observed by amateur astronomers as the more famous Messier objects.

HUBBLE CAPTURES INTRICACIES OF R AQUARII, A SYMBIOTIC BINARY STAR ROUGHLY 700 LIGHT-YEARS FROM EARTH – OCT 16

- Residing only roughly 700 light-years from Earth in the constellation Aquarius, R Aquarii is a symbiotic binary star: a type of binary star system consisting of a white dwarf and a red giant that is surrounded by a large, dynamic nebula. As the closest symbiotic star to Earth, R Aquarii was studied by none other than Edwin Hubble in an effort to understand the mechanism that powers the system.
- R Aquarii undergoes violent eruptions that blast out huge filaments of glowing gas. This dramatically demonstrates how the universe redistributes the products of nuclear energy that form deep inside stars and jet back into space.



HUBBLE CAPTURES A NEW VIEW OF GALAXY M90 – OCT 18

- This NASA/ESA Hubble Space Telescope image features the striking spiral galaxy Messier 90 (M90, also NGC 4569), located in the constellation Virgo. In 2019, Hubble released an image of M90 created with Wide Field and Planetary Camera 2 (WFPC2) data taken in 1994, soon after its installation.

- That WFPC2 image has a distinctive stair-step pattern due to the layout of its sensors. Wide Field Camera 3 (WFC3) replaced WFPC2 in 2009 and Hubble used WFC3 when it turned its aperture to Messier 90 again in 2019 and 2023. That data resulted in this stunning new image, providing a much fuller view of the galaxy's dusty disk, its gaseous halo, and its bright core.

WEBB FINDS CANDIDATES FOR FIRST YOUNG BROWN DWARFS OUTSIDE THE MILKY WAY – OCT 23

- Near the outskirts of the Small Magellanic Cloud, a satellite galaxy roughly 200,000 light-years from Earth, lies the young star cluster NGC 602. The local environment of this cluster is a close analog of what existed in the early universe, with very low abundances of elements heavier than hydrogen and helium.

- The existence of dark clouds of dense dust and the fact that the cluster is rich in ionized gas also suggest the presence of ongoing star formation processes. Together with its associated HII region N90, which contains clouds of ionized atomic hydrogen, this cluster provides a valuable opportunity to examine star formation scenarios under dramatically different conditions from those in the solar neighborhood.

- Brown dwarfs are the more massive cousins of giant gas planets (typically ranging from roughly 13 to 75 Jupiter masses, and sometimes lower). They are free-floating, meaning that they are not gravitationally bound to a star as exoplanets are. However, some of them share characteristics with exoplanets, like their atmospheric composition and storm patterns.

NASA'S PERSEVERANCE CAPTURES 'GOOGLY EYE' DURING SOLAR ECLIPSE – OCT 31

- From its perch on the western wall of Mars' Jezero Crater, NASA's Perseverance rover recently spied a "googly eye" peering down from space. The pupil in this celestial gaze is the Martian moon Phobos, and the iris is our sun.
- Captured by the rover's Mastcam-Z on Sept. 30, the 1,285th Martian day of Perseverance's mission, the event took place when the potato-shaped moon passed directly between the sun and a point on the surface of Mars, obscuring a large part of the sun's disk. At the same time that Phobos appeared as a large black disk rapidly moving across the face of the sun, its shadow, or antumbra, moved across the planet's surface.

SHOW AND TELL

From Start to Finish: Only 60 minutes

1925 ECLIPSE TALK BY JIM GOETZ

COSMOLOGY TALK