Howard Astronomical League Monthly Meeting

March 20th, 2025

Tonight's Agenda, March 20th, 2025

- Introductions
- Announcements
  - 2025 Star Parties & Recent Events
  - New HAL Website is Live!
  - Book of the Month – Krystal Rolon
  - What's New in Astro-gear – Dale Ghent
- Featured Speaker – Dr. Rutuparna Das, Astrophysicist with Harvard University, Center for Astrophysics
- What's Out in the Sky This Month…
  - Shallow Sky – Jim Tomney
  - What's up In Space – Wayne Baggett
- Members' Astro-Images and Sketches
- Wrap-up & Discussion

HAL Star Parties…

2025 Schedule of Star Parties

March
- March 8 – Public – Hosts: Mike Krauss, Victor Sanchez, Chris Todd
- March 29 - Members

April
- April 5 - Public (Jupiter/Europa shadow transit)- Hosts: Jose Urias, Victor Sanchez, Richard Ren
- April 26 - Members

May
- May 3 - Public
- May 24 - Members

June
- June 7 - Public
- June 21 - Members

July
- July 5 - Public (Mercury near greatest eastern elongation)
- July 26 - Members

August
- August 2 - Public
- August 23 - Members

September
- September 13 - Public (No moon)
- September 20 - Members (Saturn at opposition)

October
- October 4 - Public (International Observe the Moon Night, Moon 93.7% full)
- October 18 - Members

November
- November 1 - Public
- November 15 - Members

Regional Star Party info…
https://skyandtelescope.org/astronomy-resources/annual-stargazing-events/

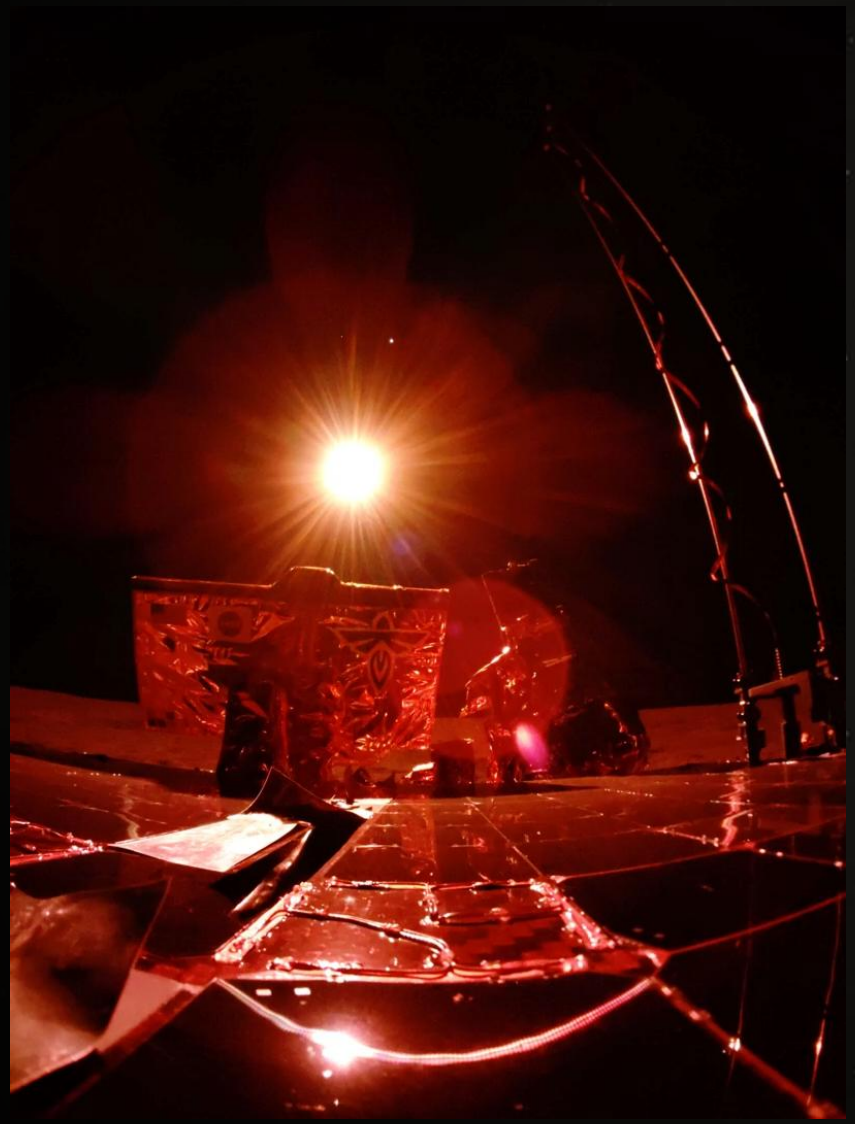
Recent/Upcoming Events

- Public Star Party Held 3/8/2025 Mike Krauss, Victor Sanchez, Chris Todd
  - 15-17 telescopes set up & 200+ visitors, despite cold temps

- Impromptu Star Party (Alpha Ridge) Held 3/13/2025 - Jose Urias, Host
  - Jose opened the park at 8:30 PM
  - Total of 5 attendees,
  - Beautiful night, temps dropped to 38° F, no winds
  - Focus was the photographing the eclipse using a variety of smart-scopes, small refractors and camera lenses with DSLRs, wrapped up at 3:45 AM

- Members Star Party Scheduled for 3/29/2025 - Jose Urias, Host

Recent Event… March 14th Lunar “Blood Moon” Eclipse: Earth Eclipsing the Sun as Viewed by Firefly Aerospace’s Blue Ghost Mission 1 Lunar Lander*



* https://fireflyspace.com/news/blue-ghost-mission-1-live-updates/

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Howard Astronomical League

About HAL | Activities | Observing | Imaging | Membership | Resources

Join HAL

Member Logout

HALO

Howard Astronomical League Observatory

Affiliations

Robinson Nature Center

Astronomical League

Howard County Recreation & Parks

DarkSky

Howard County Conservancy — connecting people to nature

Clear Sky Chart

Featured Items / News

March 20th, 2025 – Shedding Light on the Dark Side of the Universe

Presenter: Dr. Rutuparna Das, Astrophysicist with Harvard University, Center for Astrophysics The meeting will take place at 7 PM at the Robinson Nature Center and on Zoom. Topic: Shedding Light

Read More

Upcoming Events

MARCH

20 MAR — **HAL General Meeting, March 2025**
PRESENTER: DR. RUTUPARNA DAS, ASTROPHYSICIST WITH HARVARD UNIVERSITY, CENTER FOR ASTROPHYSICS

29 MAR — **Members-Only Star Party**
Alpha Ridge Park

APRIL

05 APR — **Public Star Party**
Alpha Ridge Park

17 APR — **HAL General Meeting, April 2025**
Topic: TBD

Howard Astronomical League

About HAL | Activities | Observing | Imaging | Membership | Resources

Join HAL | Member Logout

About HAL
- HAL Mission
- HALO Observatory
- Club History
- HAL Current Officers

Activities
- Monthly Meetings
- Monthly Planning Meetings
- Star Parties
- HAL Calendar
- Past Meetings

Observing
- Club Viewing Sites
- Star Party Reports
- Sky Charts
- Sky Conditions

Imaging
- Members Astrophotos
- Object of the Month
- Discord Group
- Astrophotography Links

Membership
- Login
- Join HAL
- Support HAL
- HAL Documents
- AL Awardees
- HAL Store

Resources
- Join E-Mail List
- Club Equipment
- HAL Library
- Solar System Walk
- Astronomy Links
- Contact Us / Help

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Book of the Month

Title:

- Alien Earths: The New Science of Planet Hunting in the Cosmos

Author:

- Lisa Kaltenegger

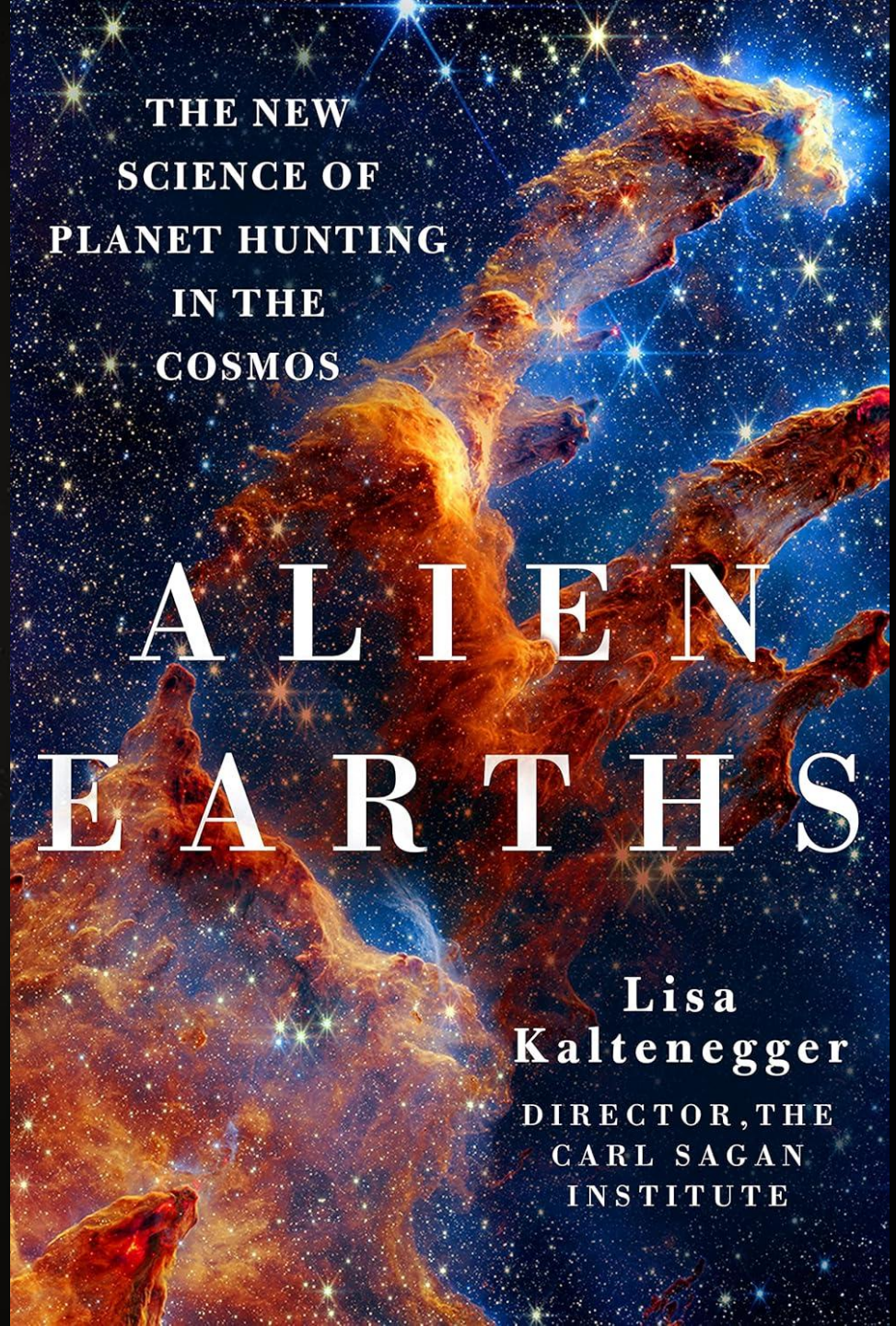
Length:

- 288 pages

Audience Level:

- Beginner Friendly
- Intermediate
- Advance/Experienced

March 2025



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What's new in gear?

Interesting developments astro-hardware and software

Dale Ghent for HAL 2025-03-20 General Meeting

Artist's Concept

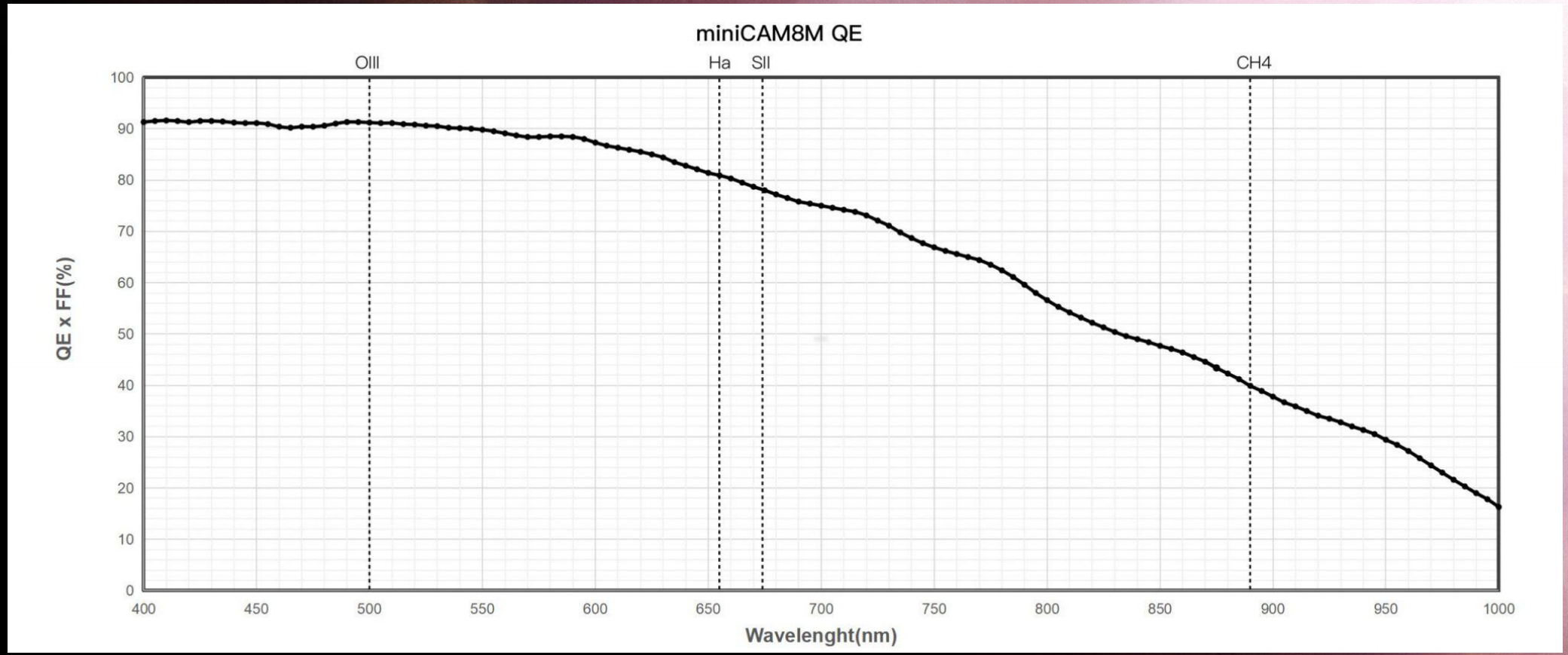
Cameras: Monochrome Sony IMX585

Small sensor with a lot of capability!

- 12.84mm diagonal, Type 1/1.2 sensor with 2.9um pixel pitch
- 8MP - 3840x2160 @ 12bpp
- Originally color-only, Sony now produces a monochrome variant that is being adopted into astronomy camera products
- Based on Sony's newer STARVIS2 tech platform - more sensitive than older sensors in the near-IR with >75%QE at H-alpha and SII (!!!)
- Perfect for budget-conscious wide-field narrowband imaging or scientific imaging in the Sloan i' and z' bands
- Monochrome (and color) camera models from QHY, ToupTek, PlayerOne, and ZWO

Artist's Concept

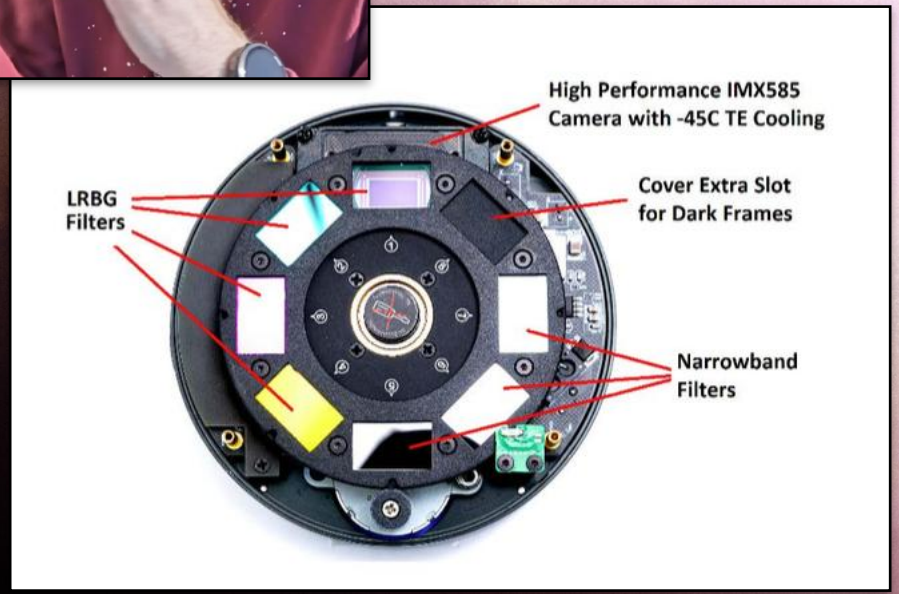
Cameras: Monochrome Sony IMX585



Artist's Concept

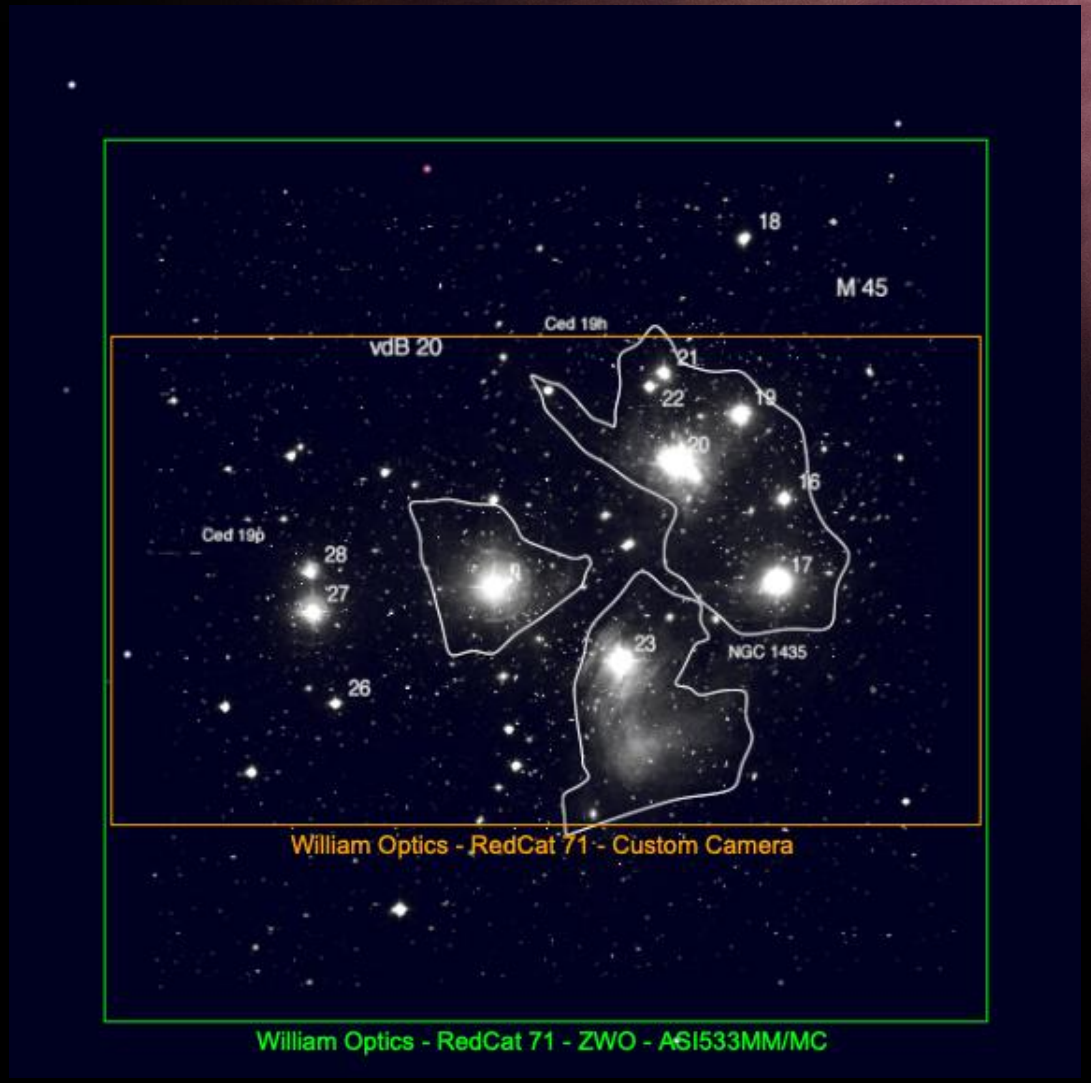
Cameras: Monochrome Sony IMX585

Interesting take: QHY's miniCAM8



Cameras: Monochrome Sony IMX585

FOV comparisons on RedCat 71 & C9.25 + 2x barlow



Artist's Concept

Mounts: WarpAstron WD-20

A new, seemingly higher-end SWG mount

- Direct connection between motor and strain-wave gear
- 20kg (44lbs) load. Weighs 5.4kg (12lbs)
- Encoder-enforced meridian, horizon, and hour angle limits
- Wireless or USB-connected hand controller
- Reviewers (Cuiv, etc.) report the no-backlash claims are true, and periodic error is indeed periodic
- Uses the popular (and open source) OnStep platform and ASCOM driver for interfacing with imaging apps
- I've observed generally favorable feedback from owners

Artist's Concept

Imaging: ASIAir competitors

The all-in-one imaging control scene sees more players

- QHY's QUARCS system in active development. A good YouTube preview video about it by Dylan O'Donnell
- ToupTek introduces StellaVita
- Both explicitly avoid vendor lock-in
- Both are Raspberry Pi-based systems running Linux and use INDI to provide device control
- Both furnish a mobile-friendly web interface and/or a mobile app for iOS and Android

Artist's Concept

Software

A roundup of recent astro-software developments of interest

- PixInsight 1.9.3 "Lockhart" - parallelization of many processes, workspace configuration improvements, WBPP and FBPP updates. Heavy preference on XISF file formats over FITS with this release
- SharpCap 4.1 - improvements to planetary live-stacking and surface feature-based tracking
- Touch-N-Stars - A new web-based, mobile-friendly web interface and plugin for interacting with NINA. Currently requires the Nightly build.
- Windows 10 - EOL 🪦 💀 🪦 for all versions of Windows 10 happens in October 2025!

Artist's Concept

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Topic: Shedding Light on the Dark Side of the Universe

Dr. Rutuparna Das, Astrophysicist with Harvard University, Center for Astrophysics

Rutuparna Das is an astrophysicist and science communicator who spends her time learning about the universe and sharing its wonders with everyone around her. After going to undergrad at MIT, she completed her PhD at the University of Michigan, where she worked on weighing clusters of galaxies and figuring out what the cosmos is made of. She's now at the Center for Astrophysics | Harvard & Smithsonian, spreading the joys of space through NASA's Universe of Learning, and continuing her research into the composition of the universe. When she's not staring at the sky (both with her naked eyes and through data from giant telescopes), she enjoys reading, crafting crazy desserts, taking an inordinate number of nature photos, and writing (sometimes silly) poetry about the cosmos.

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Shallow Sky Highlights for Feb-Mar 2025

- *Mercury Too near Sun for observation*
- *Venus Reaches Inferior Solar Conjunction this Saturday, will become morning object*
- *Mars In the evening sky but becoming a tiny disk*
- *Jupiter Our last good month before it drops lower in the western sky*
- *Saturn Too near Sun for observation*

The Spring Sky (10 pm)

- Big Dipper almost overhead
- “Arc to Arcturus”
- “Speed on to Spica”
- Leo is high in the SE

The Spring Sky

- *T CrB* (Blaze Star)
- Mars buzzes Regulus
- Mizar

What's Up in Space: HST's Bullseye Galaxy

- Collisional ring galaxies (CRGs) have been known since 1940s
  - Fritz Zwicky identified the Cartwheel Galaxy in 1941
  - Mid-1970s saw initial theoretical explanations for their structure
    - An impacting small galaxy falls through the center of a more massive disk galaxy
    - Rings of star formation are created as the gas is swept up in the induced density perturbation ("density waves")
  - Studying CRGs helps understand galaxy evolution and structure
    - Probes of gravitational field of the impacted galaxy
    - Density wave physics
    - Production of Giant Low Surface Brightness Galaxies (GLSBGs)

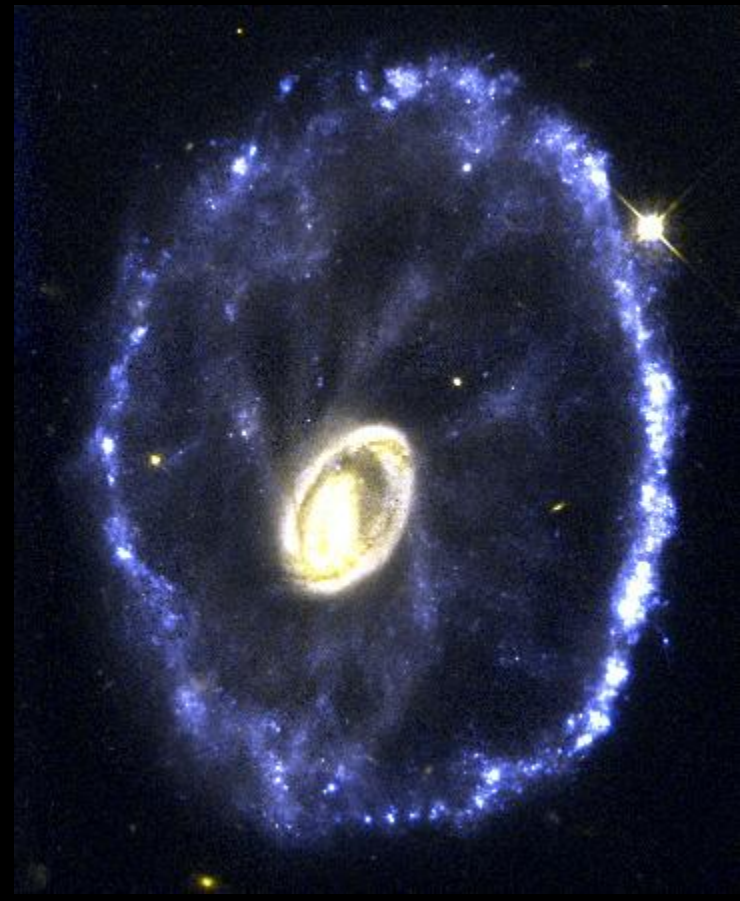

Image credit: Curt Struck and Philip Appleton (Iowa State University), Kirk Borne (Hughes STX Corporation), and Ray Lucas (Space Telescope Science Institute), and NASA/ESA

What's Up in Space: HST's Bullseye Galaxy

- LEDA 1313424 discovered by I. Pasha et al. from Dark Energy Spectroscopic Instrument Legacy Survey (DESI Legacy Survey) imaging
  - Redshift z = 0.039414 (173.9 Mpc, H_0=70km/s/Mpc)
  - Inclined ~42deg to the line of sight
  - Multiple rings seen in initial images
    - Nine rings observed, and a tenth is inferred
  - Likely impactor has been identified
    - Spectroscopy shows it is at the same redshift as the Bullseye
    - Star formation is abnormally high
    - Trail of gas between it and Bullseye
    - ➔ Clumpy blue galaxy just to the left (NE) of Bullseye

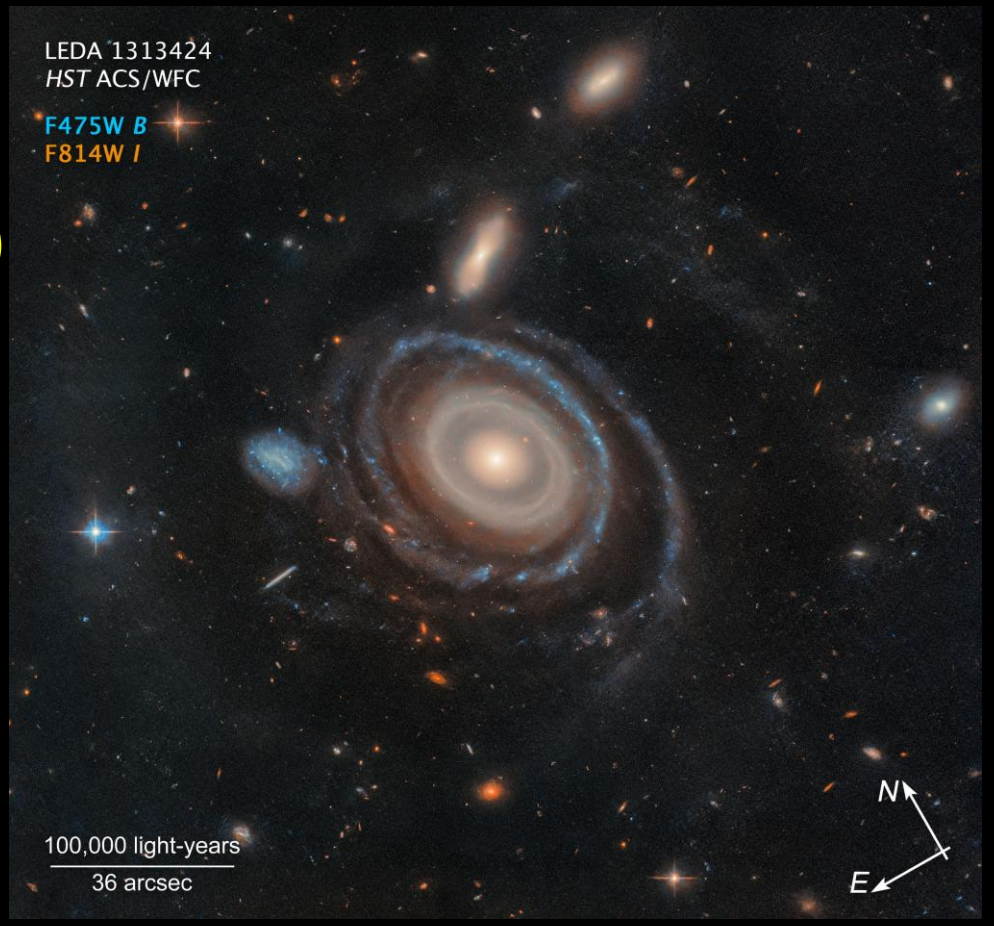

Image credit: NASA, ESA, Imad Pasha (Yale), Pieter van Dokkum (Yale)

What's Up in Space: HST's Bullseye Galaxy

- Ring observations
  - Visually fitted ellipses to the rings seen in an unsharp-mask version of HST image
    - Some ellipses were only fitted to an arc of a ring
    - Eight rings were identified
  - A ninth outer ring identified through deep imaging with ground-based telescopes
  - The rings are separated by larger amounts at larger distances from the center
    - The inner rings are piled together and perhaps merging

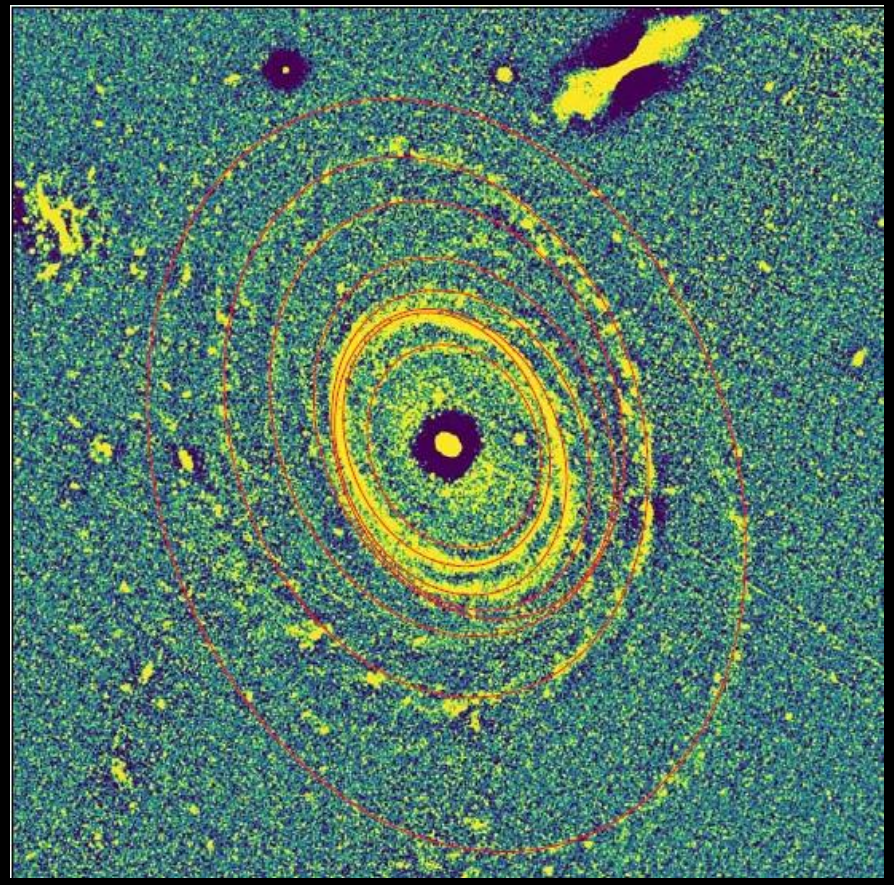

Image credit: I. Pasha et al., ApJLett,980:L3 (16pp), 2025 February 10 (Fig. 2; https://doi.org/10.3847/2041-8213/ad9f5c)

What's Up in Space: HST's Bullseye Galaxy

- Based on a 2010 analytical model by C. Struck
  - The model assumes some things, including
    - The collision is perpendicular to the disk galaxy, through the center of the disk galaxy
    - The impactor is moving quickly so that the disturbance is of short duration relative to the reaction time of the target disk properties (impulsive)
    - The disk galaxy has a flat rotation curve, i.e., a massive halo
    - No gas dynamics in the model
  - Ratio of radii of successively-produced rings is given by

$$r_i / r_{i+1} = (2i + 1) / (2i - 1)$$

    - $r_1/r_2 = 3.0$, $r_2/r_3 = 1.67$, $r_3/r_4 = 1.40$, $r_4/r_5 = 1.29$, $r_5/r_6 = 1.22$, $r_6/r_7 = 1.18$, …
  - The two outermost visible rings in the HST image have a radius ratio of 1.4, suggesting that the outermost ring is the third ring formed in the system

What's Up in Space: HST's Bullseye Galaxy

- Black dashed line shows the unity relation – the measured equals predicted – assuming the outermost HST ring's measured and predicted radii are equal
- Leftmost dashed line (blue color, ends in "Ring 8") shows the predicted ring radii *assuming* the measured values of each ring (y-axis) and that the outermost HST ring is the first (oldest, largest) ring of the system
- Next line (peach color, ends in "Ring 9") represents ring radii *assuming* the outermost HST ring is ring 2
- Open black circles are the measured rings (y-axis values) with their predicted values (x-axis), *assuming* the outermost HST ring is the third ring in the system
- Remaining lines show the ring radii *assuming* the outermost HST ring is the fourth and fifth ring formed

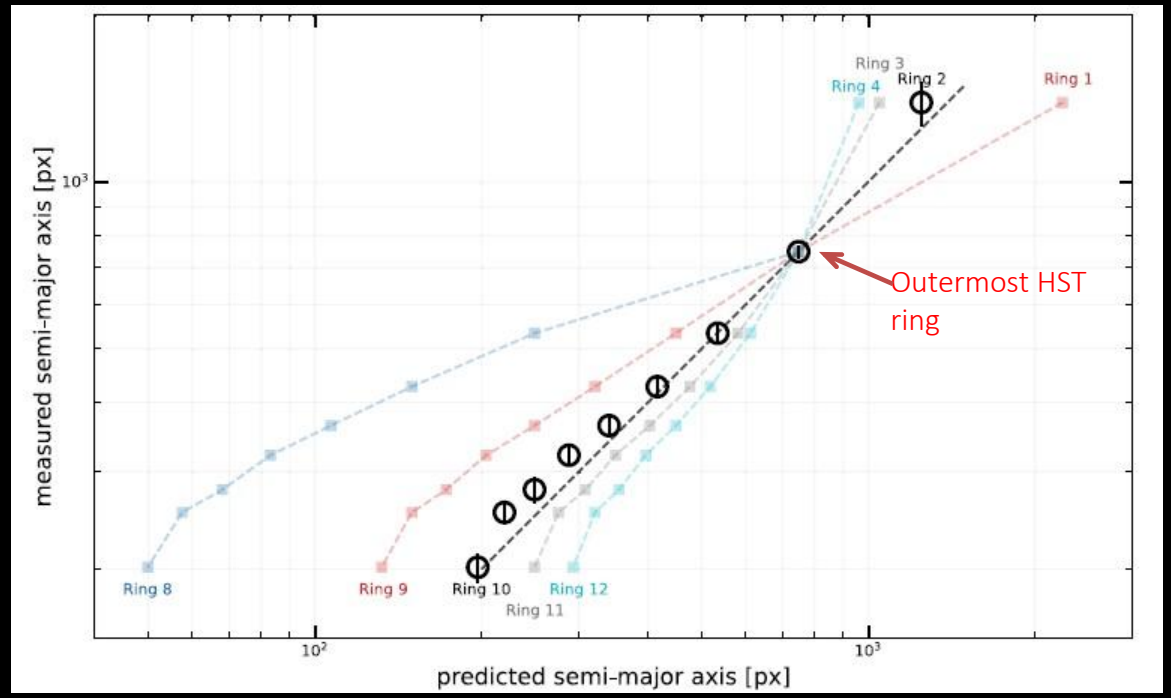

Image credit: I. Pasha et al., ApJLett,980:L3 (16pp), 2025 February 10 (Fig. 4; https://doi.org/10.3847/2041-8213/ad9f5c)

The assignment of the outermost HST ring to be the third ring of the system fits the prediction best

What's Up in Space: HST's Bullseye Galaxy

- Impactor galaxy
  - Spectroscopy with Keck has shown the following
    - The blue galaxy has a velocity of +705 km/s relative to the Bullseye
    - Assuming a perfectly head-on collision:
      - Angular separation of the impactor from the Bullseye is 43.4 arcsec, implying a projected separation of 36.4 kpc
    - Accounting for the inclination of the Bullseye (~42 deg), implies a collision ~56 Myr ago
    - Time is consistent with simulations which show that rings are visible 50 – 150 Myr after the collision

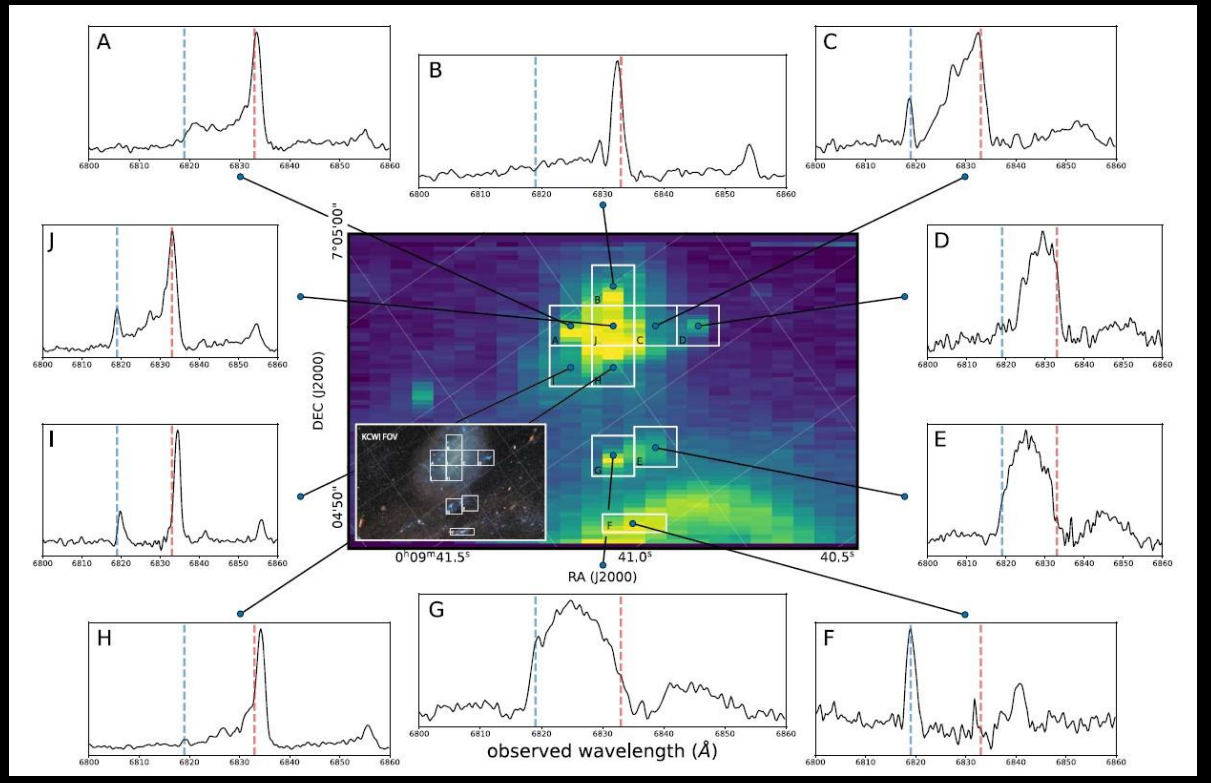

Image credit: I. Pasha et al., ApJLett,980:L3 (16pp), 2025 February 10 (Fig. 8; https://doi.org/10.3847/2041-8213/ad9f5c)

Keck Cosmic Web Imager spectra from different regions of the impactor and the Bullseye near Hα. Vertical blue lines show the Bullseye's Hα wavelength, red lines show the impactor's Hα wavelength.

What's Up in Space: HST's Bullseye Galaxy

- Forming Giant Low Surface Brightness Galaxies
  - The Bullseye may provide the first observational evidence that GLSBGs can be formed by collisions
  - Photometry provides size information as well as stellar mass estimate – 77 kpc in radius, 5.8×10^{10} M_{Sun}
    - The Milky Way is about 15 kpc in radius
    - The Milky Way's stellar mass is about 6.1×10^{10} M_{Sun}
  - HI observations provide an estimate of the gas mass – 3.5×10^{10} M_{Sun}
    - Milky Way has ~ 1×10^{10} M_{Sun} of HI
  - Extended faded rings can lead to low surface brightness features at large galactocentric radii

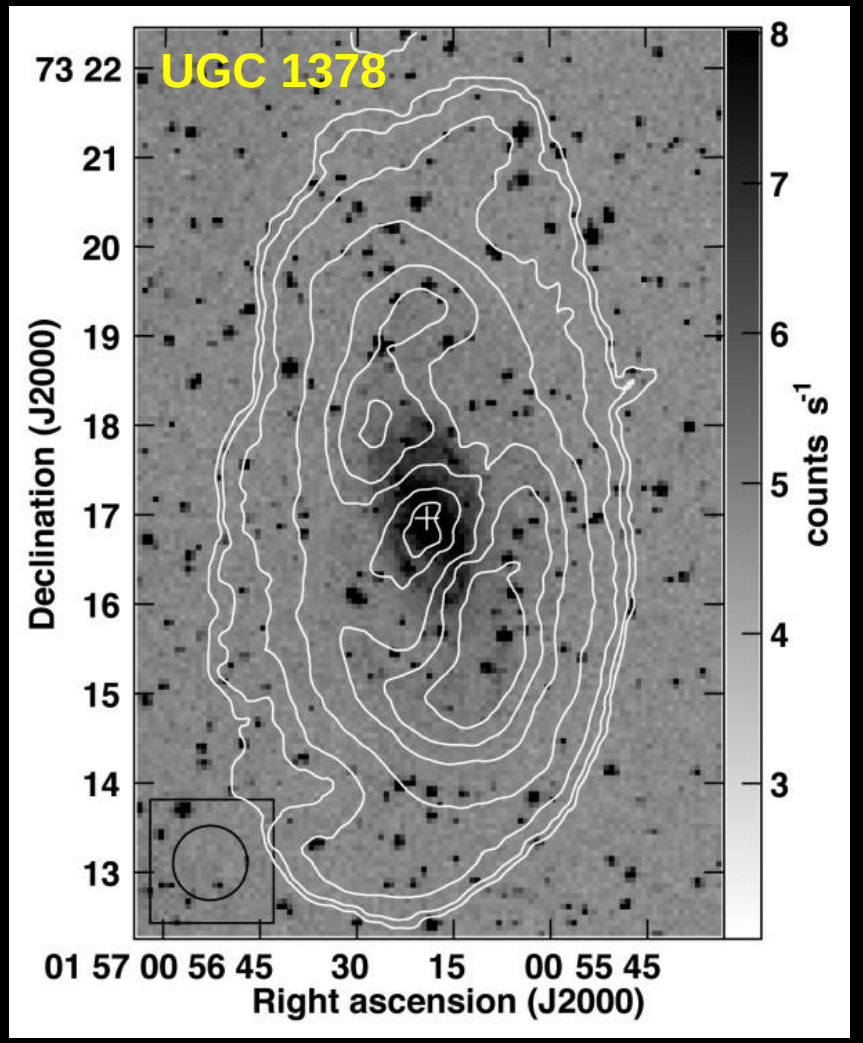

Image credit: A. Mishra, et al., MNRAS 464, 2741–2751 (2017) (Fig. 2; doi:10.1093/mnras/stw2506)

What's Up in Space: HST's Bullseye Galaxy

- Conclusions
  - The Bullseye Galaxy has enough rings to test the simple theory of the characteristics of CRGs
    - The theory seems to work well for the ring sizes
  - The impactor galaxy has been identified through both imaging and spectroscopy
  - Measurements of stellar and gas masses, as well as the size of the galaxy, support the hypothesis that GLSBGs can be formed by these central collisions

Image credit: I. Pasha et al., ApJLett,980:L3 (16pp), 2025 February 10 (Fig. 1; https://doi.org/10.3847/2041-8213/ad9f5c)

What's Up in Space: HST's Bullseye Galaxy

- Resources
  - "The Bullseye: HST, Keck/KCWI, and Dragonfly Characterization of a Giant Nine-ringed Galaxy," I. Pasha et al., **The Astrophysical Journal Letters**, **980**:L3 (16pp), 2025 February 10 https://iopscience.iop.org/article/10.3847/2041-8213/ad9f5c/pdf
  - "Applying the analytic theory of colliding ring galaxies," C. Struck, **Monthly Notices of the Royal Astronomical Society**, Volume 403, Issue 3, pp. 1516-1530 (April 2010) https://ui.adsabs.harvard.edu/abs/2010MNRAS.403.1516S/abstract
  - "GMRT H I study of giant low surface brightness galaxies," A. Mishra et al., **Monthly Notices of the Royal Astronomical Society**, Volume 464, 2741–2751 (2017) https://academic.oup.com/mnras/article/464/3/2741/2447922
  - "Galaxy Collisions," Curtis Struck, **Physics Reports**, **321**, 1, 1999 https://ned.ipac.caltech.edu/level5/Struck/St_contents.html

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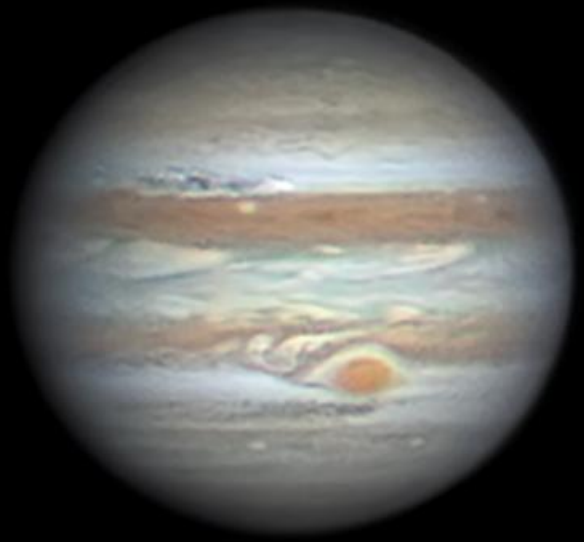
“Japanese Lantern” Effect 5 minutes pre-eclipse

Mid-Eclipse

James Willinghan



Elevation: 67 Degrees
CM1: 107.9 CM2: 82.9 CM3:239.4
Elkridge, Maryland USA/Meade 12" LX200/ ASI174MM

January 23rd 2025 @0029.8UT
@JamesWillinghan

CM1: 277.5
Elevation: 48 Degrees
Elkridge, Maryland USA/ Meade 12"/ASI174MM

January 23rd 2025 @0131.6UT
@JamesWillinghan

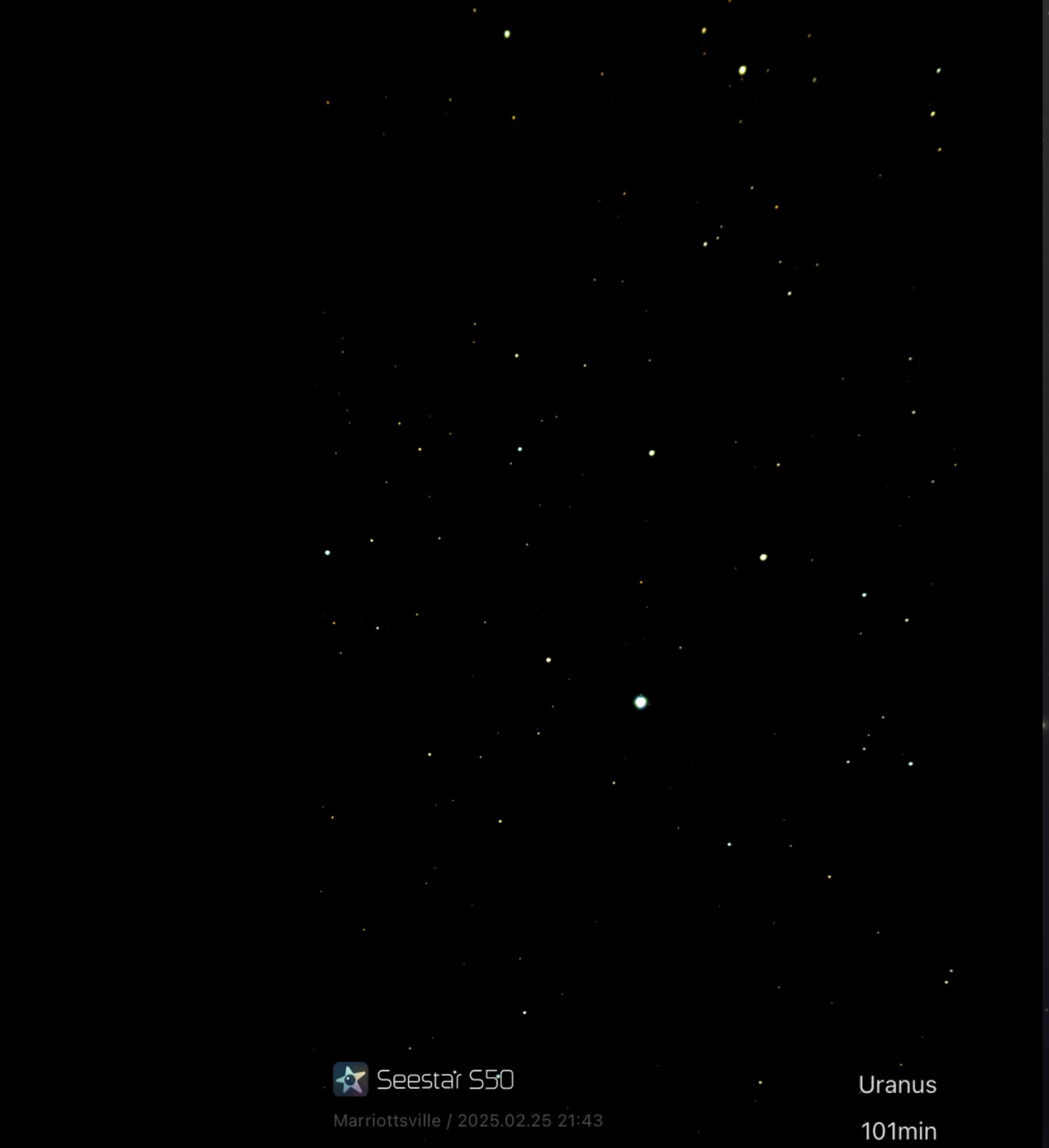
James Willinghan

Seestar S50

Marriottsville / 2025.03.14 02:54

Moon

Harrini Ramasamy



Harrini Ramasamy

Allen Everett

Allan Everett

1 Feb 2025

21 Feb 2025

25 Feb 2025

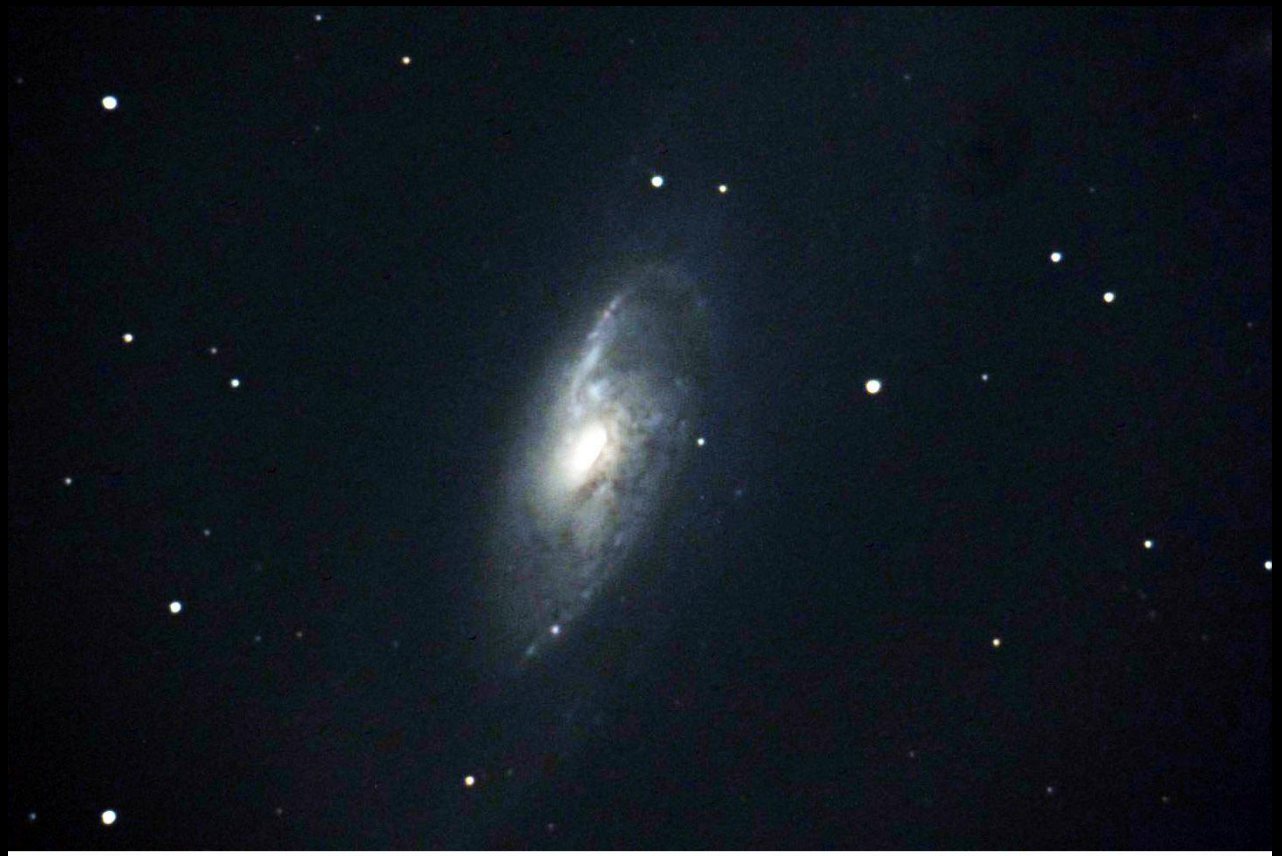
2 Mar 2025

10 Mar 2025

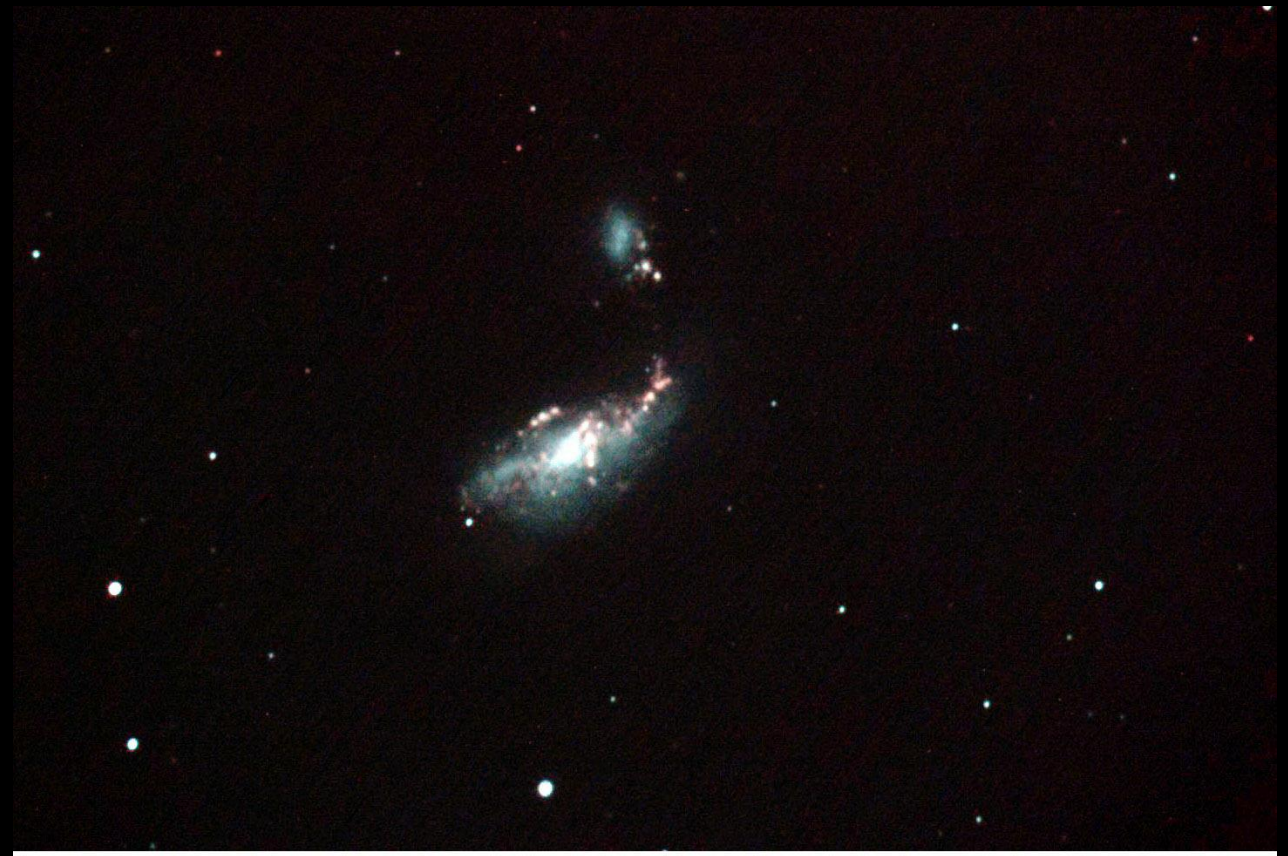
13 Mar 2025

Venus

Stephen Gauss



M106 exp 40s 15 frames



NGC4490 exp 120s 16 frames Optolong Enhance

Stephen Gauss

Joe Novotka

Thank you