COOL SPACE/COSMOLOGY/ASTROPHYSICS NEWS

ARTEMIS II

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ICPS deploys CubeSats
ICPS Earth disposal
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NASA
ARTEMIS
PROXIMITY OPERATIONS DEMONSTRATION SEQUENCE
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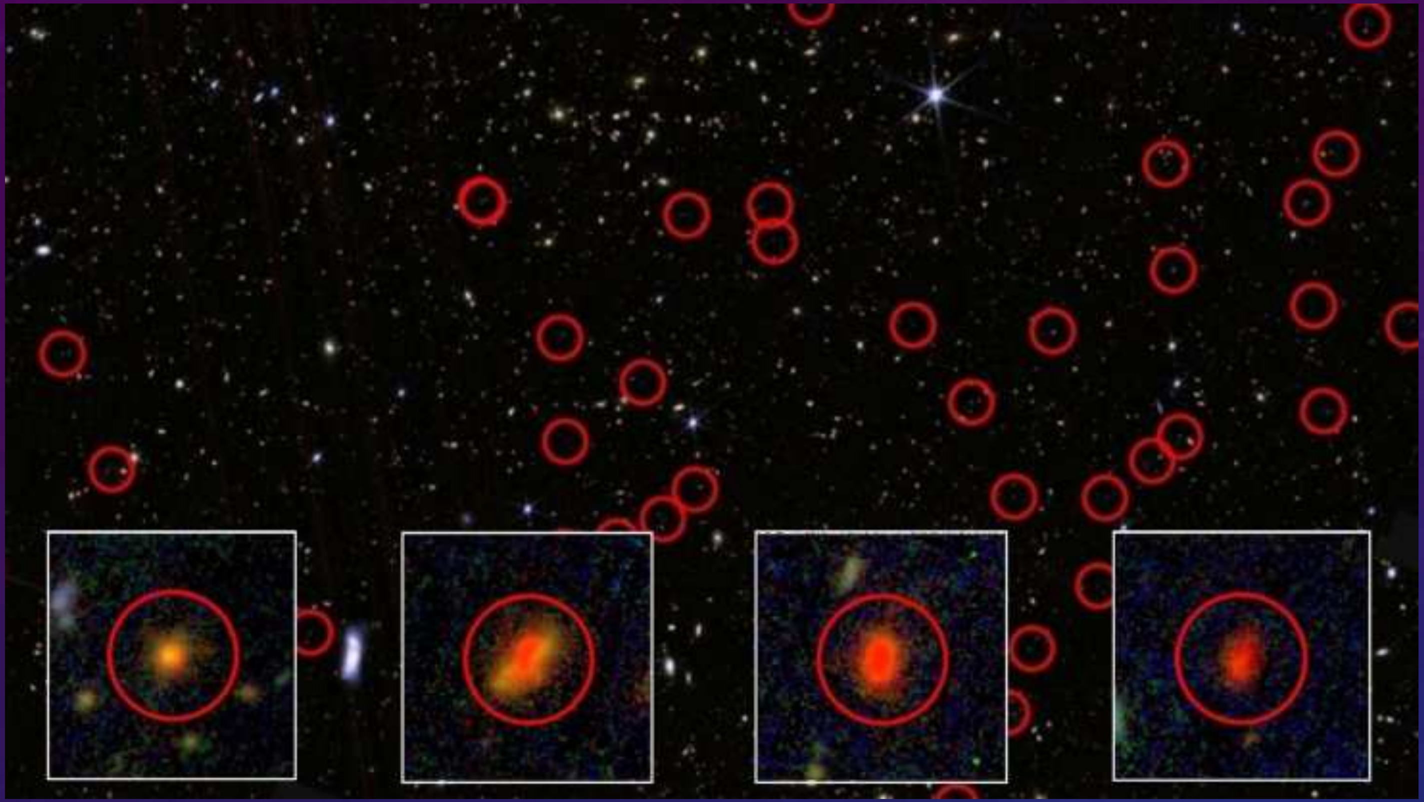
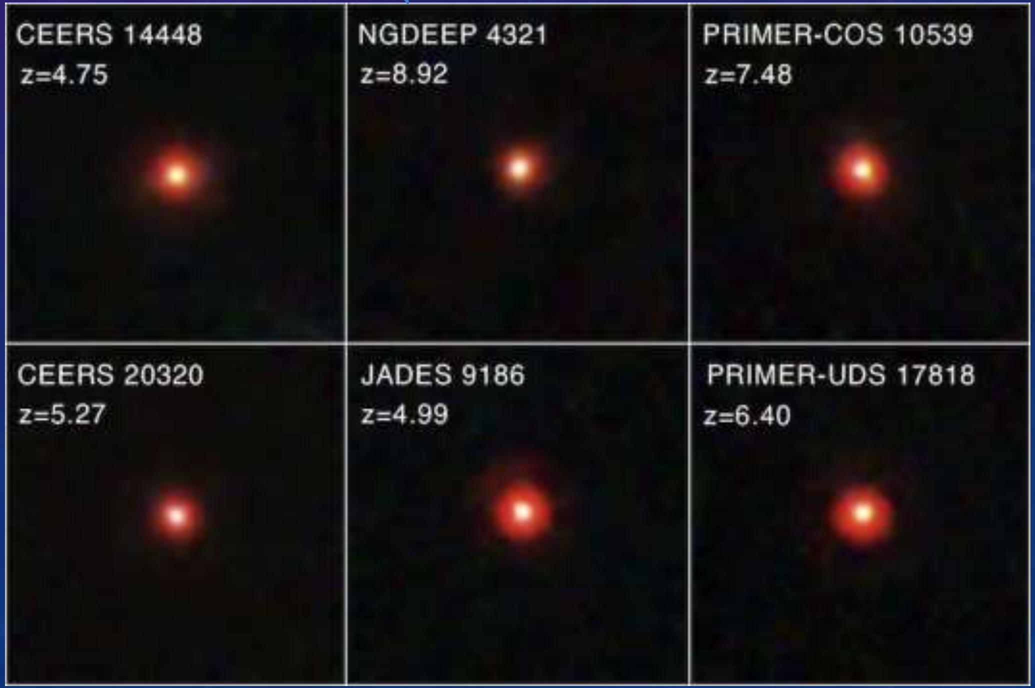
ARTEMIS II
First Crewed Test Flight to the Moon Since Apollo
1 LAUNCH
Astronauts lift off from Launch Pad 39B at Kennedy Space Center.
2 JETTISON SOLID ROCKET BOOSTERS, FAIRINGS, AND LAUNCH ABORT SYSTEM
3 CORE STAGE MAIN ENGINE CUT OFF
With separation.
4 PERIGEE RAISE MANEUVER
5 APOGEE RAISE BURN TO HIGH EARTH ORBIT
Begin 23.5-hour checkout of spacecraft.
6 ORION SEPARATION FROM INTERIM CRYOGENIC PROPULSION STAGE (ICPS) FOLLOWED BY PROX OPS DEMO
Plus manual handling qualities assessment for up to 2 hours.
7 ORION UPPER STAGE SEPARATION (USS) BURN
Begins high Earth orbit checkout. Life support, exercise, and habitation equipment evaluations.
8 PERIGEE RAISE BURN
9 TRANS-LUNAR INJECTION (TLI) BY ORION'S MAIN ENGINE
Lunar free return trajectory initiated with European service module.
10 OUTBOUND TRANSIT TO MOON
Outbound trajectory correction (OTC) burns as necessary for lunar free return trajectory; travel time approximately 4 days.
11 LUNAR FLYBY
4,047 mi/6,513 km (mean) lunar far side flyby altitude.
12 TRANS-EARTH RETURN
Return trajectory correction (RTC) burns as necessary to aim for Earth's atmosphere; travel time approximately 4 days.
13 CREW MODULE SEPARATION FROM SERVICE MODULE
14 ENTRY INTERFACE (EI)
Enter Earth's atmosphere.
15 SPLASHDOWN
Ship recovers astronauts and capsule.
AIIMM-08.20.25

LITTLE RED DOTS (LRD)



About 500 Million Years post Big Bang



The first stars, known as Population III stars, began forming approximately **100 to 200 million years** after the Big Bang

The first galaxies are thought to have formed roughly **300–500 million years** after the Big Bang, as gravity pulled early star clusters together inside dark-matter halos. This marks the transition from isolated Population III stars to the earliest galactic structures.

Galaxies too [illegible] be there.

Black hole as the main component of LRDs fits the [illegible]st number of the observations made of the objects so far.

Harvard–Smithsonian Center for Astrophysics, started a program called RUBIES, or Red Unknowns: Bright Infrared Extragalactic Survey. The program spent a significant amount of Webb telescope time — 60 hours — analyzing thousands of red and bright objects.

Their data calls the objects “The Cliff”. These objects we could say unambiguously, are neither a normal galaxy nor a black hole — it has to be a new type of cosmic object,”

The Cliff also shares similarities with theoretical objects called Quasi-Stars (A quasi-star is a star that’s powered not by nuclear fusion but by a black hole, which is surrounded by a massive cloud of gas that makes it shine like a star.), which were predicted in 2006 — well before little red dots were discovered.

From 2015 paper by Katherine Freese, she predicted a theoretical object call Dark Stars. Dark Stars are stellar objects made (almost entirely) of hydrogen and helium, but powered by the heat from Dark Matter annihilation, rather than by fusion. They are in hydrostatic and thermal equilibrium, but with an unusual power source. Weakly Interacting Massive Particles (WIMPs), among the best candidates for dark matter, can be their own antimatter and can annihilate inside the star, thereby providing a heat source.

It’s hard to pinpoint at what stage of the little red dot debate the scientific community might be right now, but most researchers think they are not even close to a resolution. However, that’s what makes the objects so interesting.

COSMOLOGISTS COLLABORATE TO SHARPEN MEASUREMENTS OF THE HUBBLE CONSTANT

Drawing together leading experts from across the field, an international collaboration of cosmologists has created a unified approach for measuring the value of the Hubble constant.

HUBBLE TENSION

🔭 Two ways to measure the Hubble constant H_0

Scientists measure the universe's expansion rate in two fundamentally different ways:

1.Early-universe method (CMB-based):

- Uses the **cosmic microwave background**, the afterglow of the Big Bang.
- Best measured by the **Planck satellite**, giving **H_0 (approx 67 km/s/Mpc)**.
- This value comes from fitting the ΛCDM cosmological model to the CMB.

2.Late-universe method (distance ladder):

•Uses **Cepheid variable stars** and **Type Ia supernovae** as "standard candles."

•Best measured by the **SH0ES collaboration**, giving **H_0 (approx 73 km/s/Mpc)**.

These two values differ by far more than their uncertainties allow — a statistically significant and persistent disagreement.

🧭 The Hubble tension is the disagreement between early- and late-universe measurements of the Hubble constant. It's one of the most important open problems in cosmology because resolving it may reveal new physics about dark energy, the early universe, or the fundamental structure of cosmology itself.

In 2025, the International Space Science Institute (ISSI) in Bern addressed Hubble Tension problem by hosting a special workshop. Through the event, every expert in the field was invited to gather together to determine which parts these measurements have in common, and which are independent and reinforce one another.

"We then developed a statistical framework to properly combine all of these measurements together, and to identify any possible inconsistencies," explains co-author Adam Riess, also at the Space Telescope Science Institute.

Through this thorough approach, members of the collaboration were able to agree on a measurement compatible and consistent across their differing techniques. As a result, they could reach a consensus on a single value for the Hubble constant.

The paper: **The Local Distance Network: a community consensus report on the measurement of the Hubble constant at 1% precision** was published in Astronomy & Astrophysics, the milestone could bring us a step closer to understanding why the universe appears to be expanding faster than our standard cosmological model predicts.