Friends Of Galileo

ASTRONOMY CLUB

Greg Smith – editor

Volume 24, No. 9
February 2019

Program: Essentials of Astrophotography

Meeting: February 20
Mark Morris LGIC

Smile your on Cosmic Camera!

This month, our friend Howard Kyntych will be giving a talk on basics of Astroimaging. I am personally looking forward to this, as I have wanted to do some picture taking of the night sky. I have a nice digital SLR and a camera on my phone. What I am hoping to hear is how to do this without spending hundreds of dollars.

I am sure he will provide an insight on how to do this. I have picture envy of the many beautiful pictures of the wide sky horizon. How to make them is something that I would like to learn. I understand that trial and error are part of it. But to not make so many errors would be great. I don't want to reinvent the wheel so to speak.

I have a bazillion questions. I am sure you do too, like the following:

How do you attach a camera to a telescope? How do the pieces fit?

What do you use on a Newtonian, or a refractor? Can they be the same?

What shutter speeds are best long, short, in between.

What is good camera controlling software for a cell phone camera?

What software is there to 'stack' photos together so they bring out the best exposure?

What are good (but not pricey) software options that I can use to begin learning? I don't want software that will overwhelm me at the beginning and lead to discouragement, but something easy enough to get the hang of it before going crazy.

What are some websites that can give me pointers?

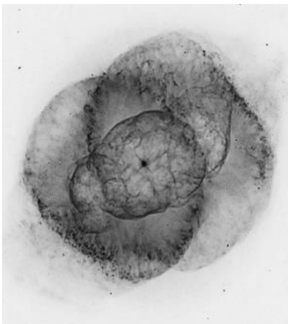
Maybe this is way more detailed than he can get into this time.

Maybe we can have other astrophotography sessions that deal with the use of cell phones, or regular DLSR cameras. This could be of interest to the rest of the community who have an interest in taking pictures of the night sky or even of how it is done.

I am sure that most of us have at one time or another tried to take a picture of a nightscape that just didn't turn out like we hoped.

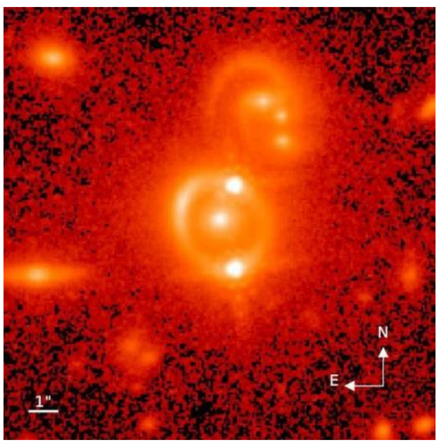
Let's listen closely and take good notes, so can try again to get a nice night sky picture.

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



Something Is Not Quite Right In the Universe, Ultraprecise New Measurement Reveals

By Mara Johnson-Groh, Live Science Contributor | February 8, 2019 07:13am ET



This Hubble Telescope image shows a doubly-imaged quasar, which can be used to measure the Hubble Constant. A new technique of measuring the Hubble Constant from such doubly-imaged quasar systems could help astronomers better understand how the universe's expansion rate has changed over time.

If their measurements of a value known as the Hubble Constant are correct, it means that the current model is missing crucial new physics, such as unaccounted-for fundamental particles, or something strange going on with the mysterious substance known as dark energy. Now, in a new study, published Jan. 22 in the journal Monthly Notices of the Royal Astronomical Society, scientists have measured the Hubble Constant in an entirely new way, confirming that, indeed, the universe is expanding faster now than it was in its early days.

"Something interesting going on"

To explain how the universe went from a tiny, hot, dense speck of soupy plasma to the vast expanse we see today, scientists have proposed what's known as the Lambda Cold Dark Matter (LCDM) model. The model puts constraints on the properties of dark matter, a kind of matter that exerts gravitational pull but emits no light, and dark energy, which seems to oppose gravity. LCDM can successfully reproduce the structure of galaxies and the cosmic microwave background — the universe's first light — as well as the amount of hydrogen and helium in the universe. But it can't explain why the universe is expanding faster now than it did early on. That means that either the LCDM model is wrong or the measurements of expansion rate are.

The new method aims to finally settle the expansion-rate debate, Simon Birrer, a researcher at the University of California, Los Angeles, and lead author on the new study, told Live Science. So far, the new, independent measurements confirm the discrepancy, suggesting new physics may be needed.

To nail down Hubble's Constant, scientists had previously used several different methods. Some used supernovas in the local universe (the nearby part of the universe), and others have relied on Cepheids, or types of stars that pulsate and regularly flicker in brightness. Still others have studied the cosmic background radiation.

Cepheids: Using Stars to Measure Extra-Galactic Distances | Video

Cepheids are a certain kind of star that changes in brightness with regular a period. This period is related to its true brightness, which means we can use them to measure distances to other galaxies.

The new research used a technique that involves light from quasars — extremely bright galaxies powered by massive black holes — in an effort to break the tie.

"No matter how careful an experiment is, there can always be some effect that is built into the kinds of tools that they're using to make that measurement. So when a group comes along like this and uses a completely different set of tools… and gets the same answer, then you can pretty quickly conclude that that answer is not a result of some serious effect in the techniques," said Adam Riess, a Nobel laureate and researcher at the Space Telescope Science Institute and at Johns Hopkins University. "I think that our confidence is growing that there's something really interesting going on," Riess, who was not involved in the study, told Live Science.

Seeing double

Here's how the technique worked: When light from a quasar passes an intervening galaxy, gravity from the galaxy causes that light to "gravitationally bend" before hitting Earth. The galaxy acted like a lens to distort the quasar's light into multiple copies — most commonly two or four depending on the alignment of the quasars in relation to the galaxy. Each of those copies traveled a slightly different path around the galaxy.

Quasars don't usually shine steadily like many stars. On account of material falling into their central black holes, they change in brightness on scales of hours to millions of years. Thus, when a quasar's image is lensed into multiple copies with unequal light paths, any change in the brightness of the quasar will result in a subtle flickering between the copies, as light from certain copies takes a touch longer to reach Earth.

From this discrepancy, scientists could precisely determine how far we are from both the quasar and the intermediary galaxy. To calculate the Hubble Constant, astronomers then compared that distance to the object's redshift, or the shift in wavelengths of light toward the red end of the spectrum (which shows how much the object's light has stretched as the universe expands).

Studying light from systems that create four images, or copies, of a quasar has been done in the past. But, in the new paper, Birrer and his collaborators successfully demonstrated that it is possible to measure the Hubble Constant from systems that create just a double image of the quasar. This dramatically increases the number of systems that can be studied, which ultimately will allow the Hubble Constant to be measured more precisely.

"Images of quasars that appear four times are very rare — there are maybe only 50 to 100 across the whole sky, and not all are bright enough to be measured," Birrer told Live Science. "Doubly- lensed systems, however, are more frequent by about a factor of five."

The new results from a doubly-lensed system, combined with three other previously measured quadruple-lensed systems, put the value for the Hubble Constant at 72.5 kilometers per second per megaparsec; that's in agreement with other local universe measurements, but still around 8 percent higher than measurements from the distant universe (the older, or early, universe). As the new technique is applied to more systems, researchers will be able to home in on the exact difference between distant (or early) universe and local (more recent) universe measurements.

"The key is to go from a point where we're saying, yeah, these things don't agree, to having a very precise measure of the level to which they don't agree, because ultimately that will be the clue that allows theory to say what is going on," Riess told Live Science.

Accurately measuring the Hubble Constant helps scientists understand more than just how fast the universe is flying apart. The value is imperative in determining the age of the universe and the physical size of distant galaxies. It also gives astronomers clues as to the amount of dark matter, and dark energy, out there.

As for explaining what possibly exotic physics might explain their mismatch in expansion-rate measurements, that's way down the line.

Minutes of the January Meeting

President Greg Smith called the meeting to order. He welcomed all the visitors.

Roy Gawlick gave an update on the Solstice Lantern Walk Through the Solar System at Lake Sacajawea. He thanked everyone for helping. It was a very successful event with 300-500 people attending. It was decided that we want to do it again next year, but we need to start the planning earlier. Roy introduced the judges for the Out Of This World Ward for best planet. The judges were Marin, Noel, & Ava Ripp. The award went to the Lilac Academy for Bright and Curious Girls for their display at Saturn. The People's Choice Award for the most online votes went ot the Girl Scouts of Western Washington for their display at Venus.

Mark Thorson was tonight's guest speaker. He talk was titled "Limiting Magnitude". He started off with a quote from Galileo Galilee, "Math is the Language of the Universe". The brightness of a star is determined by the Logarithmic scale. It also has a reverse scale: larger magnitude is dimmer and smaller magnitude is brighter. So a 1 integer jump in magnitude equals about 2.5 times ratio in brightness. At night we can see anywhere from 20 to 7000 stars depending on how much city light is around us. The limiting magnitude for stars is the dimmest object visible in the sky. It all depends on your averted vision, where you are looking (zenith vs horizon), and if you are using optics or not. The limiting magnitude of the human eye is about 6.5, binoculars are about 10, a 12" telescope is about 15, and the Hubble Space Telescope is about 32. Both your health and the atmosphere affect your visibility. You can go to www.cleardarksky.com to find out about the sky conditions in your area.

Ted Gruber gave this month's Sky Report. A total lunar eclipse occurs the night of Sunday, January 20th and will be visible across the entire western hemisphere. It begins at 7:33 pm and lasts until 10:50pm. Totality lasts for 62 minutes. Mars is high in the southwestern sky as darkness falls. Mercury returns to the evening sky in mid-February shining at magnitude -1.1. Venus and Jupiter are still in the morning sky. After January 22nd, Venus rises later and later. The moon passes about 0.1 degrees north of Venus on the morning of January 31st. Saturn also returns to the morning sky in February. The Messier of the Month is M79. M79 is a magnitude 8.6 globular cluster in the constellation Lepus the Hare. It is about 42,000 light years away and contains about 150.000 mostly red giant stars. It appears as a fuzzy star through binoculars, and as a comet-like patch of light through smaller telescopes. Larger telescopes will resolve the cluster's out regions.

Steve Powell has passed out all but 2 calendars. He will be contacting the last two people.

Mark Thorson has had a phone meeting with Mt. St. Helen's Institute. We are scheduled for August 24th and 25th. It will be right around 3rd quarter moon. They are working on finding speakers.

Ted Gruber let us know that we need programs for March through May. Ted will be next month's speaker. Howard Kyntych also volunteered.

Roy Gawlick talked more about future Solstice walks. All sponsors would like the event to keep going. Roy would like a committee to form and start having meetings right away. He would like people to run different committees. He needs to pull back on his commitments due to new job. Our Facebook page has reached over 10,000 people.

Meeting adjourned.

☞ February 2019 Meeting ☜

DATE: **Wednesday, February 20, 2019**

TIME 7:00 pm

PLACE: Mark Morris High School
Large Group Instruction Center
Use 17th Ave. entrance

PROGRAM: **"Basic Astroimaging Concepts",**
Howard Kyntych

SNACKS: Chuck Ring

DRINKS: Ted Gruber

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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 adventure.

Submit your material by E-mail to:

grlyth@msn.com