



Newsletter of the Pomona Valley Amateur Astronomers

At night the sky is pure astronomy.
Nicole Krauss



Volume 44 Number 3

nightwatch

March 2024

Speaker Announcement

Our speaker is Dave Milewski. He is a graduate student at UCLA working towards a PhD. He is also a former Citrus College student of PVAA member Dave Kary. He recently authored a paper, NEOWISE Observations of Distant Long Period Comets C/2014 B1 (Schwartz), C/2017 K2 (Pan-STARRS), and C/2010 U3 (Boattini) published in The Astronomical Journal by the American Astronomical Society. He will be talking about that paper, observing comets, and observations that amateur astronomers can make.

Club Events Calendar

Mar 22	General Meeting 7:30 PM Dave Milewski "NEOWISE and Comet Observations"	Sept 11	Board Meeting
		Sept 20	General Meeting 7:30 PM
		Sept 28	Star Party – TBD
Apr 6	Star Party–GMARS		
Apr 17	Board Meeting 6:15 PM	Oct 9	Board Meeting 6:15 PM
Apr 26	General Meeting 7:30 PM	Oct 12	Star Party – Cahuilla Park
May 4	Star Party – Cow Canyon	Oct 18	General Meeting 7:30 PM
May 8	Board Meeting 6:15 PM	Nov 2	Star Party – TBD
May 17	General Meeting 7:30 PM Denise Kaisler	Nov 6	Board Meeting 6:15 PM
Jun 8	Star Party – TBD	Nov 15	General Meeting 7:30 PM
Jun 12	Board Meeting 6:15 PM	Nov 27	Board Meeting 6:15 PM
Jun 21	General Meeting 7:30 PM	Dec 7	Holiday Party
July 10	Board Meeting 6:15 PM		
July 19	General Meeting 7:30 PM		
July 27	Star Party – TBD		
Aug 7	Board Meeting		
Aug 16	General Meeting 7:30 PM		
Aug 31	Star Party – TBD		

PVAA General Meeting 2/23/24

PVAA had its February General Meeting in room B460 of the Shanahan Building on the Harvey Mudd campus of the Claremont Colleges. It was announced that it is now time to pay your dues to the club. \$30 per individual, or \$40 per family per year. Students under eighteen are discounted to \$12.50.

Our speaker for the night was PVAA's own Dr. Scott Little. Dr. Little is a professor at Cal Poly Pomona, and a Data Scientist at So Cal Edison. His topic for the night was 'Electro Magnetic Pulses (EMP), Cloaking, and Seismic Activity.'

A couple of weeks ago the Earth was hit with a large solar flare in the Australia and Indonesia region. This disrupted the power grids in the area. Scientists have noticed that a couple of days after a solar flare hits, there is an increase in seismic activity. So, the question arises: Are they related? If so, why?

First, what is an electromagnetic pulse (EMP)? Wikipedia says it is a brief burst of electromagnetic energy. The EMP can be naturally occurring or artificial. An EMP can be caused by a lightning strike, a solar flare, or a nuclear detonation. The first recorded damage from an EMP came with the solar storm of August 1859, known as the Carrington Event. A Coronal Mass Ejection (CME) from the Sun hit the Earth and caused auroral displays as far south as Puerto Rico. Several telegraphs went down and even caught fire. If a similar event happened today, it would cause widespread outages and major havoc to our electrical grid and communications equipment.

A study showed that a nuclear weapon detonated 40 to 400 kilometers above the ground can generate an EMP that could affect up to 70% of the US electric power grid, depending on the intensity. Solar flares can energize long power lines and overload transformers, causing outages. To shield your electronic devices, you need a Faraday cage which is a metal layer, a non-conductive layer, and then another metal layer. Everyone has one in their home - it is called a microwave oven. (Preferably unplugged.) They should keep your mobile phones and laptops safe.

Dr. Little took data from 1992 to 2014 – monthly sunspot activity and monthly magnitude six or greater earthquakes, and found a significant correlation between the two, with a day or two lag between the sunspots and the earthquakes. The data came from NOAA, NASA, and USGS sites.

The thinking is that the charged particles hit the Earth, they are disturbing the magma around Earth's core. This causes the magma to move more, which causes more earthquakes. Scientists published in Nature magazine that they found a clear correlation between proton density and the occurrence of large earthquakes (mag > 5.6), with the shift of one day. <https://www.nature.com/articles/s41598-020-67860-3>

We are preparing grids for EMPs in two ways: Creating micro grids so if one neighborhood goes down, it will not bring down the bordering district. Another is to shield, or cloak, the electronics by running the pulse around the power lines and equipment.

Dr. Little talked about the Laser Interferometer Gravitational-Wave Observatory (LIGO) <https://www.ligo.caltech.edu/> and cosmic strings. He then presented some math that he calls KKOGFAB (Koopman Von Neuman, Galerkin-Isogeometric Optics, Feynman-Kac, CFT-Boltzmann) stochastic brane-knot theory. He then mentioned knot theory. Knots are non-trivial to two major "theories of everything." Proofs and Theorems were next, showing some of his 'light math'

$$Ks(x_f, w_f, \tau_f; x_i, w_i, 0) = \langle x_f, w_f | e^{-zL} | x_i, w_i \rangle =$$

$$\int_{-\infty}^{+\infty} \frac{1}{2} dz^{-(d+1)} dx^{-(d+1)} \exp \left(\begin{aligned} & \partial_a c \partial \phi a v_k + \frac{\partial \phi b^{d-1} w_k}{2\Delta} + \partial z d \phi^2 w_k \dots \\ & + c(z) m^2 \phi^2 \Delta w_k \frac{(k+1)}{(k-1)} + \sigma w_k \frac{(k+1)}{(k-1)} \end{aligned} \right) e^{-zL} v(x(t)) \hat{f}(w) x^{-z} dw; \quad (20).$$

Massive explosion on the sun causes blackouts near Australia and Asia (msn.com)
Monday 02-05-2024

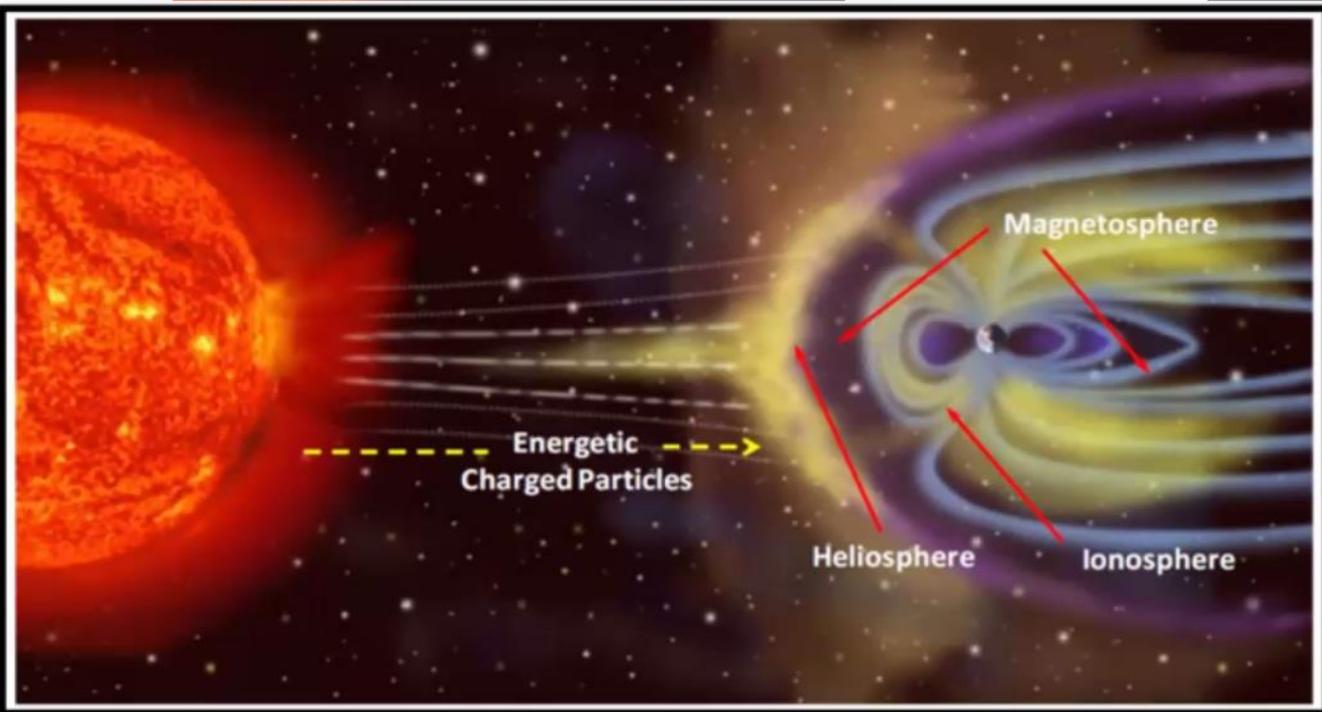
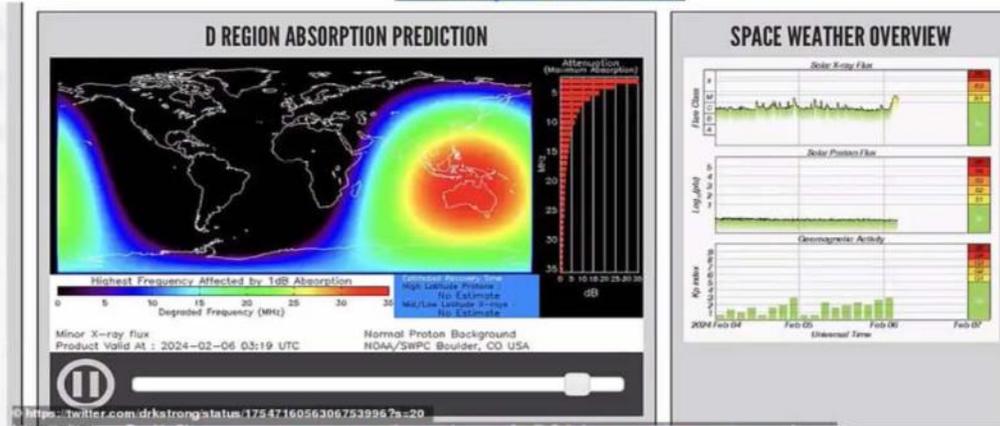


Fig. 2: Coronal mass ejection (CME) (NASA)

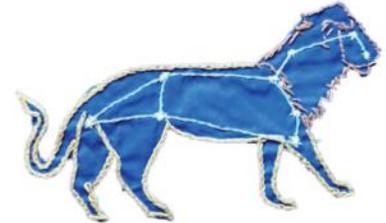
If you'd like to learn more, here is Scott's website: <https://www.zuriky.com/>

April 2024 Another Look
Leo and Leo Minor

New Moon April 8 @1121, Full Pink moon the 23rd @ 1648.
In Old English it is the Moon after Yule and also the Snow moon
Native American names include the Breaking ice Moon, Broken Snowshoe Moon, Budding Moon, When the Ducks come back Moon and when the Geese lay eggs Moon. In different parts of the continent we find the Sucker Moon, Sugar Maker Moon and in the Dakota's, When the Streams are Navigable Moon. The Celts have Hare Moon and Growing Moon.



April 6, lunar occultation of Saturn visible from Antarctica.
April 8 Total Solar Eclipse visible in the US
April 9, lunar occultation of Venus visible from Florida



In Spanish its León y León Menor, in German Löwe und Kleiner Löwe.
In French its Lion et Petit Lion, Italian Leone e Leone Minore and in Greek Its Λιοντάρι και μικρότερο λιοντάρι or Liontári kai mikrótero liontári.

<https://ras.ac.uk/media/932>

This incredible image is an embroidery created by Professor Shirin Haque, Professor in Astronomy at the Department of Physics at the University of the West Indies on the island of Trinidad and Tobago. The embroidery was done to celebrate the naming of HD 96063 (host star) and HD 96063b (exoplanet) as Dingolay and Ramajay. Her website is found on: [Prof. Shirin Haque | The Department of Physics \(uwi.edu\)](#)

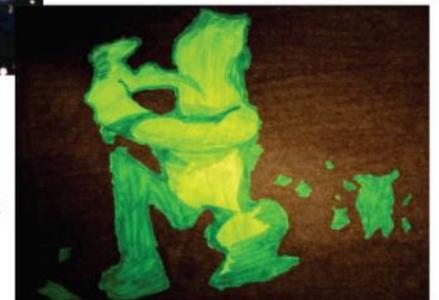
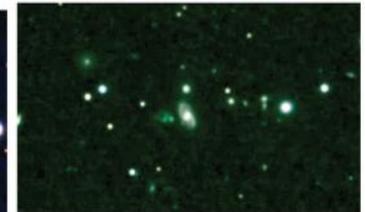
Leo Minor was created by the Polish astronomer Johannes Hevelius in 1687 and included it in his *Catalogus Stellarum Fixarum*. The constellation's name means "the smaller lion" in Latin. Hevelius created the constellation from 18 stars between the larger constellations Leo and Ursa Major.

In 1870, the English astronomer Richard A. Proctor renamed the constellation "Leaena", or the Lioness, in an attempt to shorten constellation names to make them easier to manage on star charts, but sadly, we have no lady lion constellation anymore.

Le Petit Lion contains two formally named stars. Those approved by the International Astronomical Union (IAU) are Illyrian- HD 82886 and Praecipua aka 46 Leonis Minoris. The Illyrians are a Balan people now inhabiting Albania. Illyrian has a planet named Arber, the original name for the Albanians

Leo Minor has at this counting nine exoplanet systems, three of which are HD 87883, HD 82886 (G0D), and Kelt-3 (F2D).

Hanny Van Arkel is a Dutch schoolteacher who in 2007 noticed an unusual object in an image from the Hubble. The image was of IC2497, an 11th magnitude spiral in Leo Minor about 4x4 arcmins in size.



Hanny was studying I2497, when she discovered her Voorwerp as part of a project developed by Galaxy Zoo, a citizen/scientist program. Amateurs were assigned objects imaged by Hubble and studied the objects to determine classification and characteristics. [Lars Zetterlund](https://www.flickr.com/search/?text=hanny's%20voorwerp) [https://www.flickr.com/search/?text=hanny's voorwerp](https://www.flickr.com/search/?text=hanny's%20voorwerp)
Hanny's Voorwerp is a quasar ionization echo. I have several links below help you search for understanding.

https://en.wikipedia.org/wiki/Hanny's_Voorwerp#/media/File:Hs-2011-01-d-print.jpg

https://en.wikipedia.org/wiki/Hanny's_Voorwerp%23/media/File:Hs-2011-01-d-print.jpg and

<https://www.zooniverse.org/projects/zookeeper/galaxy-zoo/about/research> and

Read more about Galaxy Zoo at: <https://www.zooniverse.org/projects/zookeeper/galaxy-zoo/about/research> and <https://www.zooniverse.org/>

Check here for more images of quasar ionization echos or Vorwerpjes:

https://en.wikipedia.org/wiki/Hanny's_Voorwerp#/media/File:Extended_Gas_In_Active_Galaxies.jpg

I used the image by Gary Imm <https://www.astrobin.com/2efji6/?q=voorwerp> because I was looking for something close to what you will see visually. IC 2497's magnitude is in the 11's and the Voorwerp is around 17. But if you look at I2497 telescopically you will see a galaxy with an active nucleus hiding a black hole about 10 million times the size of our sun. When the black hole was going crazy and created the Voorwerp, its size was 10 trillion times the size of our sun and just think, we are get to look at it.



Going from the sublime to the sublime, Arp 107 is a pair of interacting galaxies in the process of merging. They have an apparent magnitude of 14.6. [https://www.flickr.com/search/?text=arp 107](https://www.flickr.com/search/?text=arp%20107)

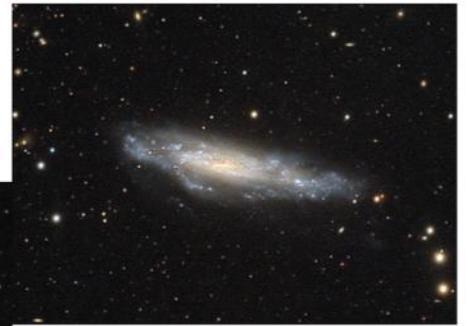
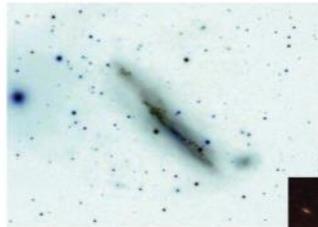
NGC 3432, sometimes known as the Knitting Needle Galaxy, lies 3 degrees southeast of the star 38 Leonis Minoris. It appears almost edge-on and can be observed in amateur telescopes. Its about 11th mag.

NGC 3003 is a barred spiral. It is 5.8 arc minutes in size and is about 12th magnitude, as you will see, its almost edge-on. <https://www.astrobin.com/search/?q=ngc+3003>

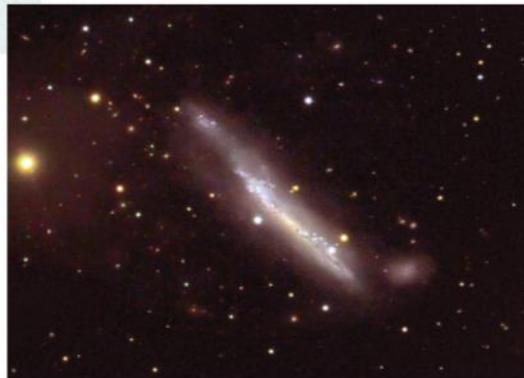
NGC 3344 is a spiral galaxy seen face-on. It is approximately 25 million light years distant and 7.1x6.5 arc minutes in size. Its about 10th mag.

<https://www.astrobin.com/search/?q=ngc+3344>

NGC 3504 is an 11th mag. barred spiral. It is a starburst galaxy, a region of massive star formation. Two supernovae were observed in the galaxy in recent years, one in 1998 and another in 2001. The other galaxy is 3512.



[Mantrap Catalog](#)



NGC 3504

Arp 206 is NGC 3432/UGC 5983. 3432 is an intriguing object well worth additional study. We call it a starburst galaxy because it is being disturbed by its neighbor, dwarf galaxy UGC 5983, that blot at the bottom right of the two images. U5983 is part of the focus this month...

faint, dwarf galaxies. We are lucky in this one because the two are interacting. Be sure to study 3432 for bright variable outbursts, knots of star formation and, of course, its tail. 3462 is in the 11th magnitude, but work hard to pick up U5983. By the way, a rule of thumb is that a 12.5 inch telescope can find every NGC object.

<https://images.mantrapskies.com/search/designation=arp+206>

<https://www.astrobin.com/search/?q=ngc+3432>

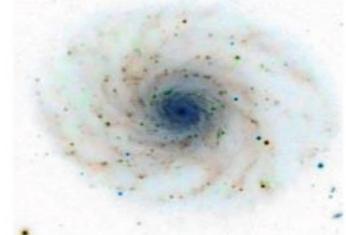
U5983 is 17th magnitude. All things being equal and average, your 30" F/5 Dobsonian will just barely reach 17th magnitude. I you take an image of these guys, please let me know. Thanks, Dave

NGC 3486 is a nice almost appearing face-on galaxy. It is in the 10th magnitude range. I inverted the image to show the extended spiral arms and the bright specs of star formation, areas you can pick up. <https://images.mantrapskies.com/catalog/NGC/NGC3486/index.htm>

<https://images.mantrapskies.com/search?designation=ngc+2859>

NGC 2859 is a little small, with an apparent magnitude in the 11's and about 4'x4'. Is is described as a barred lenticular galaxy but its big deal is its ring.

NGC 3158, 59, 63 is a group in the northern part of LMi. It is found by looking at the apex of an equilateral triangle with Beta LMi and 21 Lmi.



You will need some glass for this grouping, 3158 is in the 13th and the others exist around the 14th. 3160 is an odd galaxy, probably do to a collision and possible merging. 3163,59 and 31 seem to be grouped together and close in images will show them surrounded by a ring and a tail on 3159. <https://images.mantrapskies.com/search?designation=ngc+3158>

The proper names of stars in Leo that have been officially approved by the International Astronomical Union (IAU) are:
 Adhafera—Arabic- Lock of hair,
 Algieba-Arabic Al jeb-bah- the forehead ,
 Alterf- Arabic-the Glance.

Let it be noted that many of the Arabic names are for stars in their particular constellation of Leo, which stretched from Virgo through to Gemini.

Chertan – Ribs
 Denebola-*Deneb Alased* -tail of the Lion,
 Formosa, Formosa is the historical name of Taiwan used in the 17th century, meaning beautiful in Portuguese.
 Subra- right knee, and
 Zosma-girdle.
 Regulus-Prince or Little King,

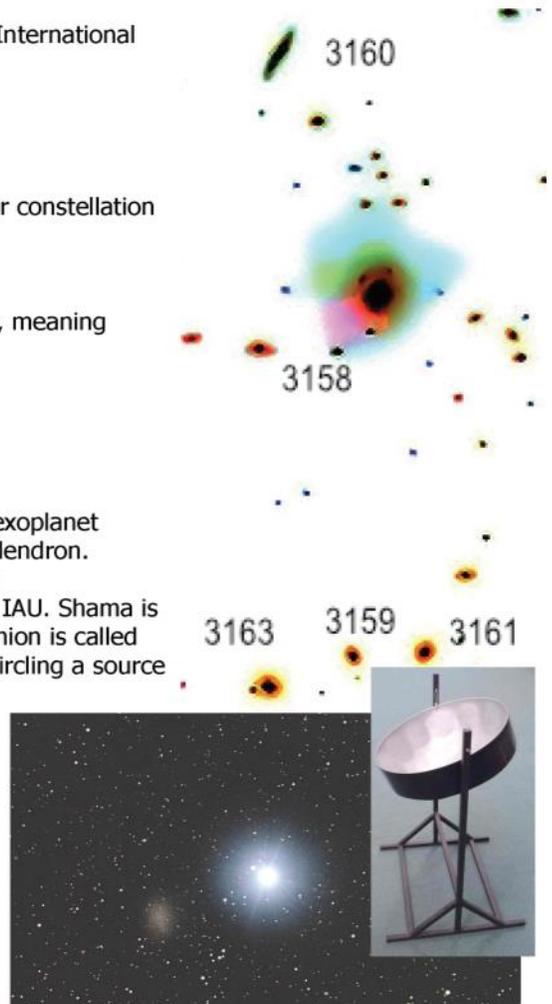
There are over 50 exoplanetary systems in Leo, several named.

Sagarmatha-HD 100777-is the Nepali name of Mt. Everest and the exoplanet revolving it was named as Laligurans, the Nepali name of the flower Rhododendron.

The star HD 99109 is named Shama. The name was selected in the NameExoWorlds campaign by Pakistan, during the 100th anniversary of the IAU. Shama is an Urdu literary term meaning a small lamp or flame. The exoplanet companion is called Perwana, meaning 'moth' in Urdu, alluding to the eternal love of an object circling a source of light.

Dingolay means to dance, twist and turn in elaborate movements, symbolizing the culture and language of the ancestors of the people of Trinidad and Tobago. Ramajay means to sing and make music in a Steelpan. The Steelpan is a musical instrument invented in Trinidad and Tobago. Steelpan musicians are called Pannists, image off of the Internet.

Noquisi is the Cherokee for star, Rasalas is the northern star of the lion's head. Noquisi and Awohali come from the Cherokee language, meaning "star" and "eagle," respectively. These are the first that a star or exoplanet has officially carried a name in the indigenous language of a North American people. <https://www.flickr.com/search/?text=Leo I galaxy> Tom Wildoner

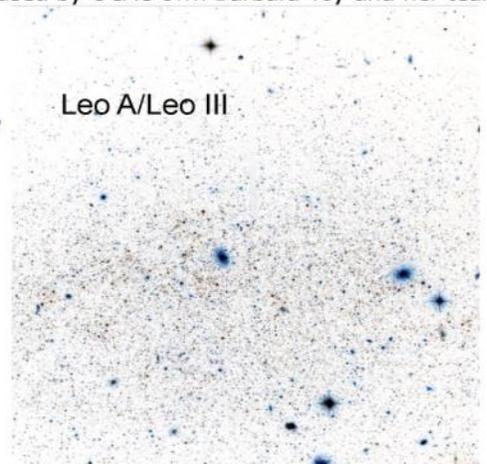


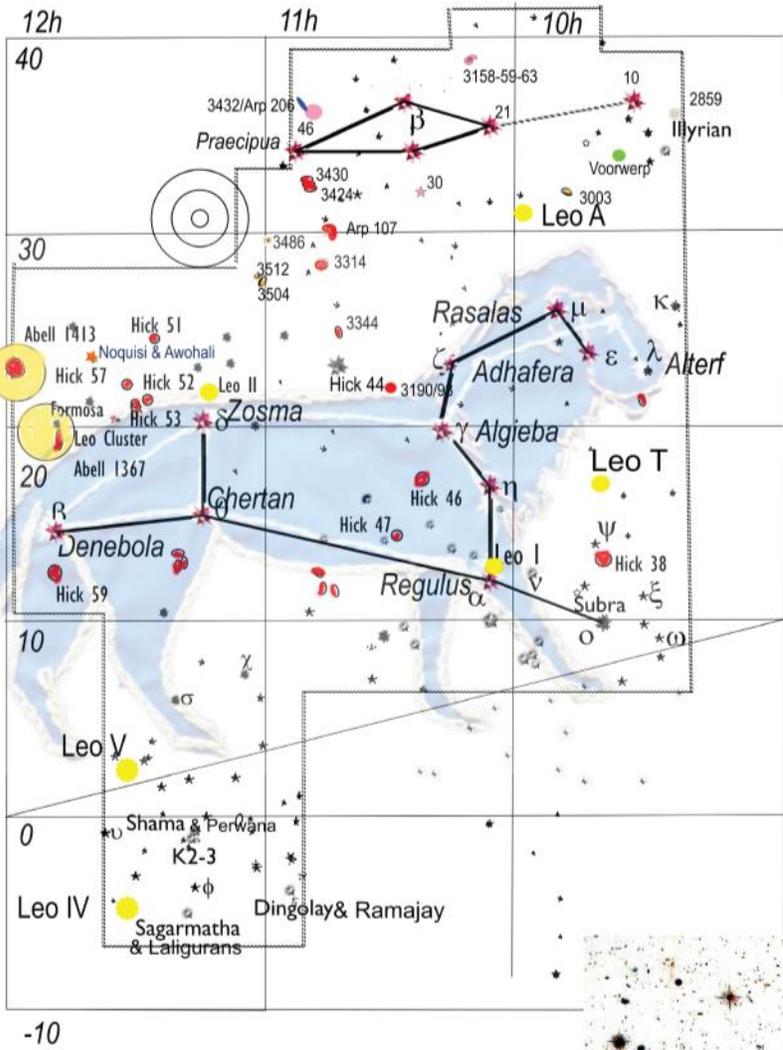
Leo I is 11.2 magnitude and is one of the most distant satellites of the Milky Way galaxy. It was discovered in 1950 on plates from the Palomar Observatory Sky Survey, taken with the 48-inch Schmidt camera. I found it rather easily in my 17.5. You will need to put Regulus outside the field of your eyepiece. This technique was used by OCA's own Barbara Toy and her team to observe Sirius B. Leo I could be the youngest dwarf spheroidal satellite galaxy of the Milky Way. Just look at that image, ain't it pretty.



<https://www.flickr.com/search/?text=Leo II galaxy>

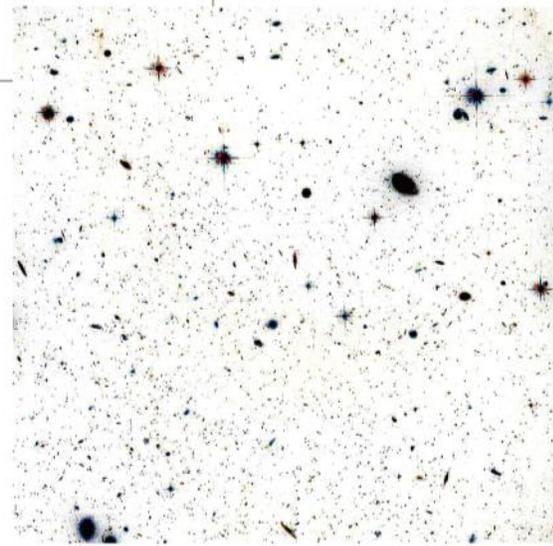
← Leo II will be harder. It is smaller and dimmer but still find-able. Last I read, Leo II and apparently most dwarf galaxies have very high stellar masses but





9h Professionals are positing they are the best source to study Brown dwarfs and the enigmatic Dark Matter. **The circles on the chart represent 1^o, 2.5^o's and 5^o's.**

The other dwarf galaxies in Leo are challenging to unobtainable to most of our amateur telescopes. When you get an opportunity to use some big glass under a dark sky, try them out. Leo III, also known as Leo A, is mag 12 but I never searched for it. It is also metal poor and irregular. Leo III is a see through galaxy. I couldn't find any amateur images of Leo III, Leo VI, Leo V and Leo T. You will find an image of Leo III taken by Subaru. Leo IV and V are down near the southern tip of Leo under his rear paws. Leo IV is a dwarf discovered in 2006 by the Sloan Digital Sky Survey. It has an approximately round shape. <https://apod.nasa.gov/apod/ap041110.html>. Also look at this image by Judy Schmidt on flickr. [https://www.flickr.com/search/?text=Leo III galaxy](https://www.flickr.com/search/?text=Leo%III%galaxy) a Hubble image amateur processed by Judy Schmidt



Leo IV



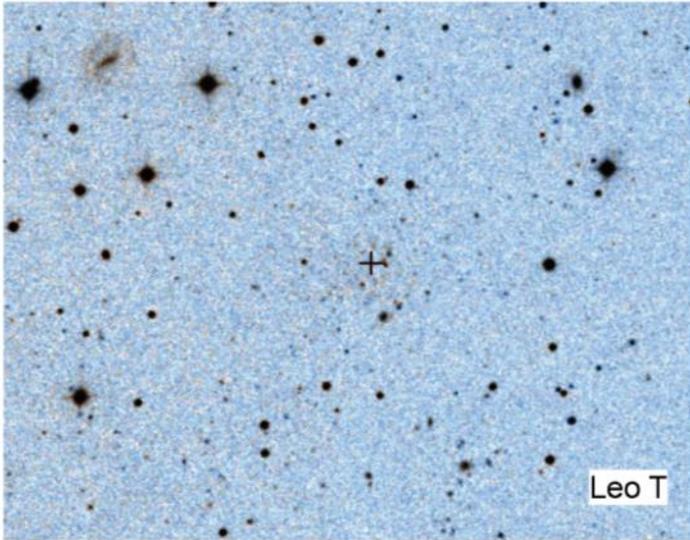
<http://resonaances.blogspot.com/2016/>

Leo IV and Leo V are two of the smallest and faintest satellites of the Milky Way. When dark matter is discussed in reference to these two galaxies, its because each galaxy shines with only about 10 or 15 thousand times the luminosity of our sun but have masses of of 1.5 million in the case of Leo IV and 330,000 in the case of Leo V. I have a Hubble image of IV but V is apparently made of unobservleium. Best I could do is get you is a finder image from Simbad.

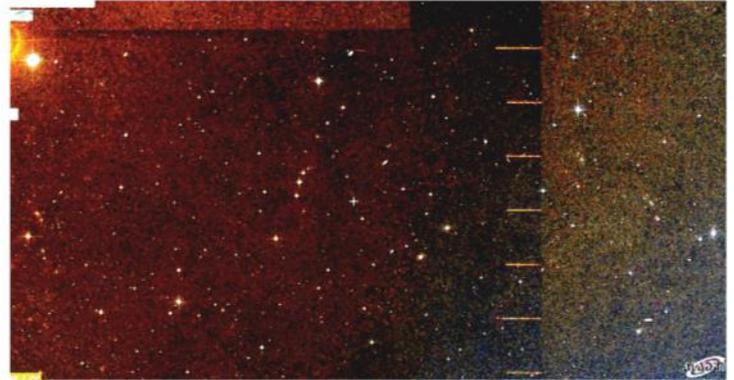
I went to the Sloan Digital Sky Survey to see this guy but all I got is the same basic finder chart I got from Simbad. Overall magnitude is less than 16. I went into the Sloan image as far as I could, but still could not pull anything identifiable from the background.

These two guys are only a few degrees from each other, so theoretically they could be partners. A least one survey suggests a bridge between the two. Both images have been manipulated.

Much like VI and V, faint, sparse and metal poor, Leo T is found under Leo's nose. It was discovered by Sloan. This is not much more than a finders chart. Its probably less than 16^{th} . Once again, T has a mass to light ratio of about 140, making it another prime candidate <http://simbad.u-strasbg.fr/simbad/sim-basic?Ident=NAME+Leo+V> for dark matter.



Leo T



<https://simbad.u-strasbg.fr/simbad/sim-id?Ident=Leo+T&NbIdent=1&Radius=2&Radius.unit=arcmin&submit=submit+id>

This reverse image of Leo T is from Simbad. I was pleasantly surprised to find enough information in the image to bring it out. The galaxy, which isn't apparent on the original image is Leda 87165. Leda is the Lyon-Meudon Extragalactic Database, the data

from Leda was used to create the PGC catalog. More info at Wikipedia - https://en.wikipedia.org/wiki/Lyon-Meudon_Extragalactic_Database

Dark Skys Dave



This article is distributed by NASA's Night Sky Network (NSN).

The NSN program supports astronomy clubs across the USA dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, and more!

Participate in Eclipse Science

By Kat Troche

April is NASA's Citizen Science Month, and there is no shortage of projects available. Here are some [citizen science projects](#) that you can participate in on April 8th, on and off the path of totality right from your smartphone!



Eclipse Soundscapes, ARISA Lab / NASA

Eclipse Soundscapes

Eclipse Soundscapes will compare data from a 1932 study on how eclipses affect wildlife – in this case, crickets. There are a number of ways you can participate, both on and off the path. **NOTE:** you must be 13 and older to submit data. Participants 18+ can apply to receive the free Data Collector kit. Learn more at: eclipsesoundscapes.org/

GLOBE Eclipse

Folks that participated in the **GLOBE Eclipse** 2017 will be glad to see that their eclipse data portal is now open! With the GLOBE Observer smartphone app, you can measure air temperature and

NASA Night Sky Notes

April 2024

clouds during the eclipse, contributing data to the GLOBE program from anywhere you are. Learn more at: observer.globe.gov/



HamSCI, The University of Scranton / NASA

HamSCI

HamSCI stands for **Ham Radio Science Citizen Investigation**. HamSCI has been actively engaged in scientific data collection for both the October 14, 2023, annular solar eclipse and the upcoming April 8, 2024, total eclipse. Two major activities that HamSCI will be involved in around the solar events will be the **Solar Eclipse QSO Party (SEQP)** and the **Gladstone Signal Spotting Challenge (GSSC)** which are part of the HamSCI Festivals of Eclipse Ionospheric Science. Learn more about these experiments and others at: hamsci.org/eclipse



SunSketcher™

SunSketcher, Western Kentucky University / NASA

NASA Night Sky Notes

April 2024

SunSketcher

If you're traveling to totality, help the **SunSketcher** team measure the oblateness, or shape, of the Sun during the eclipse by timing the flashes of Baily's Beads. You will need a smartphone with a working camera for this, along with something to hold the phone in place - don't forget a spare battery! NOTE: The app will need to run from five minutes *before* the eclipse starts until the end of the eclipse. Any additional phone use will result in Sun Sketcher data loss. Learn more at: sunskecher.org/

Don't stop at the eclipse - NASA has citizen science projects you can do all year long – from [cloud spotting on Mars](#) to [hunting for distant planets!](#) By contributing to these research efforts, you can help NASA make new discoveries and scientific breakthroughs, resulting in a better understanding of the world around us, from the critters on the ground, to the stars in our sky.

We'll be highlighting other citizen science projects with our mid-month article on the [Night Sky Network](#) page, but we want to wish all you eclipse chasers out there a very happy, and safe solar eclipse! For last minute activities, check out Night Sky Network's [Solar Eclipse Resources section!](#)

In addition to using checks and cash, PVAA Members can now pay their dues using Zelle. Send your payment to mathew.wedel@gmail.com using Zelle and it will go into the PVAA bank account. Please. Include your name and membership type in the Zelle comments.

PVAA Membership Renewal for April 30, 2024

- \$30 - Individual Membership
 \$40 – Family Membership
 \$18 Student Under age 18 Membership

Name: _____

Email address for Newsletter delivery: _____

Address: _____

City: _____ State: _____ Zip: _____

Please send check payable to PVAA to:

PVAA
 Attention: Treasurer
 P.O. Box 162
 Upland, CA 91785

Thank you for your continued membership!