



Veil Nebula by LAS member Gary Garzone

**Longmont Astronomy Society Newsletter**  
**December 2010**

## **From the President:**

### **Meeting Thursday December 16**

The December meeting of the Longmont Astronomical Society is this Thursday, December 16<sup>th</sup>, at the IHop Restaurant, 2040 Ken Pratt Blvd., Longmont, CO. Please join us for dinner around 6 pm at the restaurant. The general meeting will begin at 7 pm.

The speaker is Robert Arn ( see <http://barn.zenfolio.com> ). Robert is talented photographer whose wonderful photo below appeared as the "[Astronomy Picture of the Day](#)" on August 21st. His presentation will be "Imaging the Universe on a Budget".

New advancements over the past three decades have radically changed how astrophotography is done, and who can engage in this action-packed activity. With the mass production of the digital camera, anyone can go and start taking pictures of celestial objects. Even simple Point-and-Shoot or DSLR camera gives us greater ability to explore space than with the naked eye, a pair of binoculars, or even a telescope. Anyone with a digital camera and access to a computer can already start to take images of the night sky - with no additional equipment or knowledge of astronomy needed! This talk will highlight the process of taking stunning images of the universe around us on a very modest budget - mostly with equipment many people already own!

We will have nominations for next year's officers during the business meeting following Robert's presentation. Please consider volunteering to be LAS officer next year! We will also consider some proposed changes to LAS Charter and By-Laws.

The All sky Camera is back in operation on the NOAA Tower on Niwot Ridge. We took it down to correct some electrical interference problems and computer configuration changes. Special thanks to Brad Hall at NOAA for climbing in the tower in windy cold conditions to re-install it. Thanks also to Dr. Jim Elkins for his support and Gary Garzone for replacing the connectors on the new video cable.

LAS will be teaching a "Beginning Astronomy" class starting in January at the Memorial Building. See the City of Longmont Recreation "Winter/Spring" brochure on page 48.

The brochure is online at

**URL [http://www.ci.longmont.co.us/rec/activities/documents/ws11\\_adult.pdf](http://www.ci.longmont.co.us/rec/activities/documents/ws11_adult.pdf) .**

### **In the sky this month:**

#### **Meteor Showers**

Geminids still continuing at a reduced rate. I went out the morning of the 14<sup>th</sup> and didn't see nuttin'. If my neighbor doesn't turn that dumb mercury light off, I'm going to dig around in the basement and find my BB gun.

#### **Planets**

Mercury: setting at 5:16 tonight, but it's kinda cloudy

Venus: rises at 3:33 AM, nice and bright high in the eastern sky at dawn

Mars: behind the Sun

Jupiter: sets around midnight, high in the south at sunset, starting to fade  
 Saturn: rises at 1:37, high in the south at dawn and the rings are starting to open.

**Interesting Stars/Galaxies**

It's been almost three years since those of us in North America saw a total lunar eclipse. North and Central America see the entire eclipse from start to finish. Europe, Australia, and East Asia can only observe some of it due to the Moon setting or rising.

Now the whole continent is in for another on Monday night and Tuesday morning, December 20-21. Earth's shadow will totally engulf the Moon from 2:41 to 3:53 a.m. Eastern Standard Time, or 11:41 p.m. to 12:53 a.m. Pacific Standard Time, as shown in the timetable below. The partial phases of the eclipse will last for a little more than an hour beforehand and afterward.

<b>Total Eclipse of the Moon, December 20–21, 2010</b>				
<b>Eclipse event</b>	<b>EST</b>	<b>CST</b>	<b>MST</b>	<b>PST</b>
Penumbra first seen?	12:55 am	11:55 pm	10:55 pm	9:55 pm
Partial eclipse begins	1:33 am	12:33 am	11:33 pm	10:33 pm
Total eclipse begins	2:41 am	1:41 am	12:41 am	11:41 pm
Mid-eclipse	3:17 am	2:17 am	1:17 am	12:17 am
Total eclipse ends	3:53 am	2:53 am	1:53 am	12:53 am
Partial eclipse ends	5:01 am	4:01 am	3:01 am	2:01 am
Penumbra last seen?	5:35 am	4:35 am	3:35 am	2:35 am

**Club Calendar:**

Think we have a holiday party coming up.... probably find out about it at the December meeting, I bet!

**Fiske Planetarium:**

- Astronomical Star of Bethlehem (December 21, 2010, 1:00 pm)  
 Presented by amateur astronomer Gil Buller, this exciting program examines the sky at the time of the birth of Christ to see which astronomical phenomenon may have been the Star of Bethlehem.
- + Astronomical Star of Bethlehem (December 28, 2010, 10:00 am)  
 Presented by amateur astronomer Gil Buller, this exciting program examines the

- sky at the time of the birth of Christ to see which astronomical phenomenon may have been the Star of Bethlehem.
- College vacation will keep Fiske dark for most of December.

### **Internet Resources:**

The folks at Zooniverse want your help in mapping areas of star formation in the Milky Way. Watch the tutorial at [http://www.milkywayproject.org/tutorial\\_embed.html](http://www.milkywayproject.org/tutorial_embed.html) to see if you like the idea. This is using images from the Spitzer telescope, so you'll be able to see some cool(yep, they're IR) images in the process.

This eruption back in August really did the job – watch the video, then remember the size of the Sun! Try to calculate the speed that the wavefront is going across the surface....

A global eruption on the sun has shattered old ideas about solar activity. Researchers presented their surprising findings at a press conference today at the American Geophysical Union meeting in San Francisco.

FULL STORY at

[http://science.nasa.gov/science-news/science-at-nasa/2010/13dec\\_globaleruption/](http://science.nasa.gov/science-news/science-at-nasa/2010/13dec_globaleruption/)

To illustrate the services available on the astronomy.com website, let me reproduce the sky calendar for this week.

### **Friday, December 10**

Keep an eye out for early Geminid meteors! If you see a shooting star, trace its path backward far across the sky. If this line passes near Castor in Gemini, a Geminid is almost certainly what you've seen. [Article](#).

- Jupiter shines far upper left of the Moon after dusk. A similar distance to the Moon's right is Altair. Look lower left of the Moon for Fomalhaut, sometimes called "the Autumn Star."
- The eclipsing variable star Algol in Perseus is at its minimum brightness, magnitude 3.4 instead of its usual 2.1, for a couple hours centered on 5:02 p.m. EST. It takes several more hours to rebrighten.

### **Sunday, December 12**

- High in the south at dusk, Jupiter shines left of the Moon. Above them stands the Great Square of Pegasus. As evening grows late, the whole tableau shifts lower to the southwest and tilts to the right.

### **Monday, December 13**

- A twilight challenge! Mercury and Mars appear closest, 1° apart, very low in the southwest after sunset. You'll need optical aid; the illustration here exaggerates their visibility in the still-bright sky 20 or 30 minutes after sunset. The **Geminid meteor shower** should peak late tonight. Best viewing will be after midnight, but some meteors will can be seen in mid- and late evening the despite moonlight and

the low altitude of the shower's radiant (near Castor). Already, early this morning, observers were counting 40 Geminids per hour according to the International Meteor Organization (IMO). See our [article](#). And see the IMO's [near real-time graph](#) of the shower's behavior, based on careful [standardized-method amateur counts](#) being reported worldwide.

- First-quarter Moon (exact at 8:59 a.m. EST). Jupiter is below it at dusk, and lower left of it later in the evening.
- Jupiter's Great Red Spot crosses Jupiter's central meridian around 8:06 p.m. Pacific Standard Time.

### **Tuesday, December 14**

Don't give up on the Geminid meteors even though we're past the 13th! The shower continues at reduced rates for at least a couple days.

- The beginning of winter is just a week away, but Vega, the "Summer Star," still shines as the brightest star in the west-southwest in early evening after dark. The brightest star above Vega is Deneb in Cygnus. Vega is 25 light-years from Earth. Deneb, a white supergiant, is about 1,600 light-years distant.

### **Wednesday, December 15**

- By about 9:30 p.m. local time this week (depending on where you live), the dim Little Dipper hangs straight down from the North Star as if from a nail on the north wall of the sky — and the brighter Big Dipper is rearing upward on its handle low in the north-northeast.

### **Thursday, December 16**

- Jupiter's Great Red Spot crosses Jupiter's central meridian around 8:36 p.m. Eastern Standard Time.

### **Friday, December 17**

- This evening, look lower left of the Moon (by a little more than a fist-width at arm's length) for the delicate Pleiades star cluster. Below the Pleiades by a roughly similar distance is orange Aldebaran. Far off to their left shines brighter Capella.

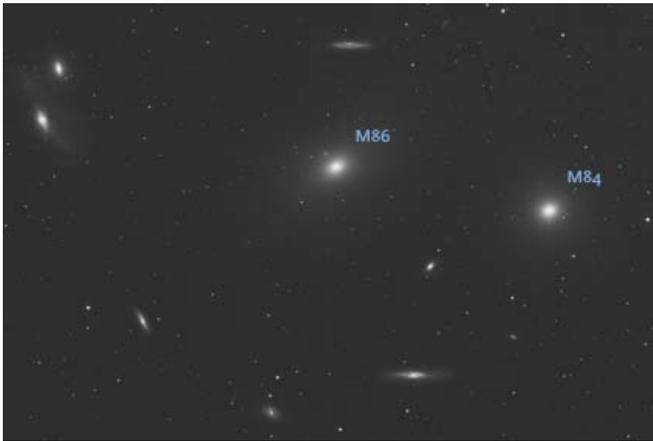
### **Saturday, December 18**

- This evening the Pleiades are only about 2° left or upper left of the gibbous Moon as seen from North America, as shown at right. Use binoculars to penetrate the bright moonlight.
- Have you made your plans for North America's total eclipse of the Moon day after tomorrow, the night of December 20–21? The Moon will be high in the late-night or early-morning sky. See the December [Sky & Telescope](#), page 61, or our article online: [A Sky-High Lunar Eclipse](#).

# Starry, Starry, Starry Night

Imagine if the 2010 census-takers had carefully counted all the residents of Texas and then, based on the Lone Star State's population density, tried to estimate how many people lived in the entire U.S. The total would be off badly, of course, having overlooked the close-packed residents in the Northeast states, Illinois, and California.

But that's the approach astronomers have had to use when guesstimating the population of stars in the universe, applying what's termed the *initial mass function* for our Milky Way to all the other galaxies out there. Using our galaxy's 200 to 400 billion stars as a cosmic rule of thumb, and pegging the number of galaxies at 100 billion or more, they get a ballpark estimate of 10 to 100 septillion ( $10^{22}$  to  $10^{23}$ ) stars in all.



The Virgo Cluster contains roughly 1,300 galaxies, including the enormous ellipticals M86 and M84. Click on the image for a larger version.

## *Digitized Sky Survey*

As staggering as this number is, it's too low, according to just-published observations by Pieter van Dokkum (Yale University) and Charlie Conroy (Harvard-Smithsonian Center for Astrophysics). The two astronomers studied eight massive elliptical galaxies in the Virgo and Coma clusters using the Keck I telescope on Mauna Kea. Their spectra reveal two distinct spectral signatures that could only come from red dwarfs, dim stars with masses less than a third that of our Sun.

Red dwarfs are very faint, typically giving off only  $\frac{1}{10,000}$  as much light as the Sun.

Barnard's Star, a well-known example just 6 light-years from us, would be an imperceptible magnitude 39 (at infrared wavelengths) if it were in one of these galaxies. So to detect the dwarfs' telltale emissions at all, Dokkum and Conroy reason that red-dwarf stars must make up at least 80% of all the stars (and 60% of the mass) in the elliptical galaxies they studied — some 20 times the abundance of red dwarfs in the Milky Way!

If most galaxies are typically this "bottom heavy," then the total number of stars must be about three times previous estimates. More importantly, the new result signals to cosmologists that different galaxies have ended up with different mixes of stars.

Ellipticals, for example, probably attained their huge masses from gobbling up other galaxies in their vicinity.

A glut of red dwarfs might mean that the interiors of nearby galaxies contain less dark matter — mysterious and unseen, yet detectable by its gravitational effects — than previously calculated. The new results are also at odds with speculations that the oldest galaxies (those seen at high redshifts) are deficient in red dwarfs.

An independent "census" of galaxies and the stars they contain is expected from the European Space Agency's Herschel space telescope, which has been measuring the luminosity of distant galaxies at infrared wavelengths — at which red dwarfs emit most strongly.

Van Dokkum and Conroy published their results in the December 1st's *Nature*.

**This month's field trip:**

Magazines: nice article online on observing the Moon thru binoculars and another on Touring the planets: Mars at the astronomy.com website.  
Since I take the IPOD along on cruises and listen to them out of range of AM/FM (and of course the selection of 4 channels on the TV...), allow me to recommend the Astronomy and Sky/Telescope podcasts. Good listening on those long, lonely nights when you're crouched over a telescope, so bored that you send everyone a picture of the thermometer in your dome (no names, please!)



**Not bad, eh? Northern Europe from the ISS with a bit of aurora in the back.**



Florida at night. See Mickey?



Eastern Med. Nile delta and Suez Canal clearly visible.