

# Another New Year's Day Celebration

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December 31, 2013

*Things you might not know about celebrating the coming new year.  
And should you wait until January 4 to toot your horn?*

**M**ost people around the world celebrate New Year's Eve on December 31 since the Gregorian calendar begins a new year the next day. But is this right? Astronomically, nothing is very important about January 1.

But wait a few days and discover, for example, that Saturday, 2014 January 4, is much more special.

**Why?** Well, Clint and Paula McLain will hold a star party at their home! But, there is much more to this date. At this time Earth reaches *perihelion*, or when our planet comes closest to the Sun (Greek *peri*, near + *helios*, sun).

During the 21st century actual dates of perihelion vary by a few days but January 3 or 4 is currently most common. In 2014 perihelion occurs January 4 at approximately 6:59 a.m. EST. Earth's distance from the Sun will then be a mere 91,406,673.2 miles (0.9833347 AU), which is 3,099,834.5 miles (0.0333474 AU) less than when farthest from the Sun (*aphelion*)!

**One Astronomical Unit (AU):** A unit of distance nearly the same as the Earth's *mean distance* from the Sun, defined as the semimajor axis of Earth's orbit (about 92,955,800 mi or 149,598,000 km). Light takes 499.00 seconds (about 8.32 minutes) to travel this distance.

On January 4 Sunlight will also take approximately *17 seconds less time* to reach Earth than when the Earth is at aphelion. Therefore, if the Sun should suddenly "go out," you would know about it approximately a quarter of a minute sooner than if the Sun were farthest away!

**So, is it better if our calendar started January 3 or 4, dates more astronomically significant for our planet?**

**Aphelion Day:** Whereas, celebrating *perihelion* means devising another holiday, *aphelion* typically falls about July 4 or Independence Day in the USA. So, in the USA, we can conveniently celebrate "Aphelion Day" along with the fireworks of July 4—no need for another American holiday.

**Some people will actually celebrate 2014 January 4 as New Year's Day.** For example, The Irish Astronomical Association will hold its annual New Year Party on this day with a

buffet meal and feature film at the Tudor Cinema, Drumhirk Road, Comber, North Ireland. (Tickets are £5 for adults if interested.) Following dinner is a prize quiz. (Did they get the idea from the AAC Holiday Party Quiz?)

**Moonstruck Observatory Star Party:** If not planning a trip to Ireland, then attend to the Clint and Paula McLain star party at their home southeast of Morrision (7150 S.E. 214th Ave), **Saturday, 2014 January 4**. They plan to prepare some munchies for everyone (meat, drinks). They say members can also contribute to make it a feast (veggies, dessert). "Eating" starts 5:00 p.m. EST. Observing can start anytime. (Sunset is about 5:45 p.m. EST.)

Contact Paula ([siriusred@centurylink.net](mailto:siriusred@centurylink.net)) if coming and if plan to contribute a meal offering. For more details, directions and registration, see AAC's web site ([alachuaastronomyclub.org](http://alachuaastronomyclub.org)) and click **Event Calendar**.

This party is a **"GO"** whatever weather or sky conditions since the McLains can't eat all the food by themselves!

Although Earth's distance from the Sun does change during the year, Earth's orbit is very circular with an *eccentricity* of only 0.0167. This says Earth's distance from the Sun varies by only 1.67 percent from our orbital mean distance so the difference between aphelion and perihelion is only about 3,100,000 miles (5,000,000 km).



This also tells us the Sun's displacement from the center of Earth's orbit is about 1.6 million miles, about six times the Earth-Moon distance. *So, the variation in distance from perihelion to aphelion will change the apparent size of the Sun in our sky, but only about 1.6 percent of its average size, or one arc minute.* This is not likely noticeable unless you placed images of the Sun at aphelion and perihelion side by side. (See figure at left.)

**Other Planetary Eccentricities:** Most planetary orbits have small eccentricities and look nearly circular when drawn. Even Pluto's orbit ( $e = 0.25$ ) appears nearly circular.

However, the Sun is displaced one-quarter of the way out from the center of Pluto's orbit. This causes Pluto's distance from the Sun to vary from 30 to 50 AUs. (See <http://tinyurl.com/onvydm2> for an animation that compares Earth's orbit with Pluto's orbit.)

**Apparent Size of Sun from Other Planets:** Since planetary orbits are elliptical, their distances from the Sun change during an orbital cycle. However, since most orbits are not very elliptical, changes in the Sun's apparent size from perihelion to aphelion are small for most planets. See <http://tinyurl.com/pm5psml> for a diagram comparing apparent diameters of Sun at perihelion and aphelion from Earth (small eccentricity), Mars (moderately small eccentricity), and both Mercury and Pluto (larger eccentricities).

The variation in the Sun's size is hardly noticeable for Earth but for Mercury and Pluto much more. (Again, see the diagram at <http://tinyurl.com/pm5psml> .) However, the disk of the Sun seen from Pluto is very small (about an arc minute) so that its disk would look “star-like” to the naked eye. However, contrary to what some authors write, the Sun would not simply appear as a “bright star.” In fact, this “bright star” would range from about 170 to 460 times the brightness of Earth's full moon depending on Pluto's distance from the Sun!

So, don't forget to help celebrate our “astronomical new year” at the McLain Star Party January 4. **And if skies cooperate, know that the evening sky of 2014 January 4 has plenty to offer:**

**Moon:** A slim, beautiful waxing 3.5 day old crescent moon (18% illumination) early in the evening, setting by 9:45 p.m. EST. Earthshine should be vivid. Maria Crisium will be nearly centered between the Moon's limb and terminator. (Look for wrinkled ridges and ghost craters within this large circular basin.) Prominent large and interesting craters to the south of Mare Crisium include Langrenus, Petavius and Funerius.

**January's Lunar Cycle:** The first day of 2014 January could be astronomically special for those who live by *lunar calendars*—a new moon occurs on this day! **Therefore, a new lunar cycle commences with the new year of 2014!**

The last time a new moon fell on January 1 for the eastern USA time zone was 1995 and the next does not occur until 2033. This cycle typically repeats about every nineteen years (the *Metonic Cycle*) but leap years and time zones can interrupt this periodicity.

**January's Black Moon:** Finally, since the Moon's lunation (*synodic period*) is approximately 29-1/2 days, January 2014 will have **two new moons**—the second falling on the 30th of the month.

The second *full moon* in a calendar month is often called a “blue moon.” So, what do you call the second *new moon* in a calendar month?

Unlike full moons, people usually do not see new moons so a second new moon usually has no special name. However, some (as the Wicca, a modern pagan, witchcraft religion) might call this new moon a “black moon.”

Furthermore, this second new moon in January 2014 steals February's new moon so February has no new moon! And what about March? Yes, two new moons again, on both the first and thirtieth days of this month.

**See note on next page about wrong information contained in a December 31 Gainesville Sun article.**

**Venus:** Time to say goodbye to this jewel of evening twilight skies. (Venus will appear in morning skies at the end of January.) The now retrograde motion of Venus to the west and

the Sun's easterly motion on the sky are rapidly closing the planet's elongation with the Sun. Try spotting feeble Venus a half hour after sundown when only 4 degrees high south of west and wave good-bye. If it is possible to train your telescope on Venus at this time, our closest planet will appear as a huge crescent less than two percent illuminated and nearly 62 arc seconds across! Good eyes might even discern the crescent without optical aid. Certainly, binoculars should show the crescent. Try it.

**Winter Sky:** A "relatively dark" winter sky (the McLains claim) follows moonset with its many offerings. Have you ever seen the *Great Andromeda Galaxy* (M31) with your naked eye? This would be a good time to try. **And how many "first magnitude stars" can you count before midnight?** (Did you know that three-quarters of the stars brighter than magnitude +1.5 visible from Gainesville are observable during the first half of early winter nights?)

**Jupiter:** This bright planet in the eastern sky has a treat in store for us. Its innermost Galilean satellite, *Io*, begins to *transit* (cross) Jupiter's disk at 10:13 p.m. (Shadow *ingress* is one minute earlier.) Although it seems the "Great Red Spot" always appears turned away from Earth when observing the giant planet (at least for me), not tonight. Jupiter's vast swirling storm will cross the earth facing side of the planet from about 6:30 p.m. to 11:00 p.m. EST.

**Quadrantids Meteor Shower:** This meteor shower ranks among the strongest of the year along with the December Geminids. Unfortunately this meteor shower peaks the day before (January 3, about 3:00 p.m. EST) and has a very narrow maximum intensity usually lasting only hours. However, forecasting the brief peak is difficult so it cannot hurt to keep an eye on the sky. Its radiant is in the constellation *Boötes*, near the end of the Big Dipper's handle. The shower's name comes from *Quadrans Muralis* or the "Mural Quadrant" (an angle measuring instrument), an obsolete constellation that is now part of *Boötes*.

So, keep looking up.

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**Gainesville Sun, 2013 December 31:** *The Gainesville Sun's* lead article in Section B titled, "From Blue moon to Beatles, how to welcome 2014" contains some very wrong information.

**A "blue moon," a second full moon in a calendar month according to some definitions, does not occur on New Year's Eve as stated in this article!**

In fact, a full moon does not fall at all on 2013 December 31 nor does December have two full moons. (A single full moon fell on December 17.)

However, the year 2018 will begin with a full moon (Eastern Time Zone) with a second "blue moon" January 30. But a New Year's Eve blue moon will not happen until 2028.

(A letter to the editor has been sent but they may not publish it.)