

## Heavenly Notables During 2009\*

— Howard L. Cohen

*Every year usually contains astronomical events that have special importance. The year 2009 is no exception. The author has singled out a half dozen not to be missed. So get out your calendars and mark these event dates*

**S**pecial astronomical phenomena occur every year. Some events are predictable and some are not, such as the appearance of a bright, new comet or a brilliant fireball. Even lists of predictable events may be incomplete since preferences often vary from individual to individual. However, the year 2009 brings a half dozen astronomical events that I have singled out as either uncommon or special or, at least, not to be missed: two planets that will do without their normal adornments, a Venus spectacular, a very special eclipse, possibly an exceptionally strong meteor shower, and a year that ends with some extra moons.

**A Planet Without (Jan. 1)** The Earth will pass through the ring-plane of Saturn on *September 4, 2009* leaving the planet apparently without rings for nearly a month (Meeus 2002). This phenomenon occurs twice during each revolution of Saturn around the Sun (29.3 years), or about every 14–15 years. Sometimes the passage of Earth through Saturn's ring-plane even results in three periods of invisibility over about nine months as in 1995–1996.

The previous ring plane crossing occurred February 1996 and the next March 2025. Unfortunately, the 2009 crossing occurs about two weeks before Saturn has a conjunction with the Sun. Then Saturn will be only 11 degrees from the Sun (its *elongation*) making this ring plane crossing difficult to observe. Unfortunately, the 2025 event also occurs when Saturn is near conjunction so 29 years must elapse to observe the “ringed planet” without rings (October 2038).

However, all is not lost.

On January 1, 2009, the ring tilt will be only 0.9 degrees, making this *the best telescope view of the rings at their thinnest for 15 years*. Suggestion: Saturn will rise about 11:00 p.m. on New Year's Eve. Celebrate the New Year then take your telescope outside and show your family, friends and neighbors the “ringed planet” nearly without rings!

And, if either the weather or end of year festivities clouds your vision, do not fret for the ring tilt will still be only 1.3 degrees a month later.

**Venus and Moon Spectacular (Feb. 27)** Brilliant Venus and a *very thin* waxing crescent Moon will have a close apparition this evening with a separation of only 1.4 degrees (less than three moon diameters). Although the crescent Moon passes Venus about every month on the sky, some close approaches (an *appulse*) are more observable or spectacular than others.

*The Moon–Venus appulse on February 27 will be more spectacular and photogenic than most.* The Moon will appear as a gorgeous, *extremely thin crescent* only 2.9 day old (9% illuminated) and will be adorned with unusually bright earthshine.

And Venus? Breathtaking since *Venus will have reached greatest brilliancy only eight days* before (February 19). Therefore, Venus will be stunningly bright with an exceptionally bright magnitude

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that may exceed -4.6! *The Observer's Handbook 2009* notes that recent photometry of Venus suggests Venus may reach magnitude -4.8, about 20 percent brighter than often published.

Sunset in Gainesville is about 6:30 p.m. EST with moonset shortly after 9:00 p.m. Nevertheless, the view will be most special during early evening against the dusk sky. Set up your camera and tripod and shoot some pretty pictures! Then send them to *FirstLight* for publication ([firstlight@floridastars.org](mailto:firstlight@floridastars.org)).

In addition, try a simple experiment during February and March. Observe Venus under moonless skies and try to see your shadow cast by Venus. (Of course, you will need a dark location.) The tremendous brilliancy of our nearest planet makes this sight possible.

Finally, take out your scope and watch the disk of Venus grow from a large crescent (44 arc seconds on February 27) to a supersized, thin crescent nearly an arc minute across at conjunction with the Sun one month later (March 27).

**One Heck of a Solar Eclipse (July 22)** Six eclipses occur in 2009 including three penumbral and one partial lunar eclipse, one annular solar eclipse and one total solar eclipse. The penumbral lunar eclipses will be either unspectacular or not visible from Florida. The partial lunar eclipse will also not be visible from most of North America. Finally, the annual solar eclipse is not very accessible crossing the South Atlantic south of the African horn before passing through the southern Indian Ocean where the annular eclipse path ends near Borneo. Besides, annular solar eclipses pale in comparison to total eclipses of the Sun.

But, just wait!

The 2009 July total eclipse of the Sun more than makes up for the other five undistinguished eclipses if you are willing to travel. *This will be the longest total solar eclipse of your lifetime* and the longest of the 21st Century. In the South Pacific Ocean the duration of totality reaches 6m39s, not to be exceeded for more than 120 years! Usually, the Moon does not completely hide the Sun during a total eclipse for more than a few minutes.

Don't want to travel? Unfortunately, the next total solar eclipse for the United States is still nearly eight years in the future, 2017 August 21, with a maximum duration of only 2m40s in western Kentucky. Although the eclipse path traverses the USA from Oregon through South Carolina, best weather prospects may be in the Pacific Northwest where totality will last only about two minutes. (The eclipse is partial in Florida.) Thus, residents of Florida may still need to journey several thousand miles to see two minutes of totality since summer rains and clouds may spoil this eclipse over the Southeast.

Meanwhile, the 2009 total eclipse path will cross the exotic country of China exiting the mainland at Shanghai before moving into the Pacific Ocean south of Japan. *Consequently, this extraordinary eclipse provides a marvelous excuse to visit this ancient land of magnificent diversity.* Moreover, maximum total eclipse duration will still reach nearly six minutes in eastern China. What a wonderful way to celebrate the *International Year of Astronomy!*

I will lead a five-star tour to China for this very special eclipse. For more information about both this eclipse and the tour, see [www.astroadventures.net/2009/CHINA](http://www.astroadventures.net/2009/CHINA). Also, see the author's article about this eclipse in the 2008 May/June issue of *FirstLight* available at [www.floridastars.org/firstltonline.html](http://www.floridastars.org/firstltonline.html).

**Another Planet Without (Sept. 3)** I mentioned that the giant planet Saturn becomes "ringless" Sept. 4 although the rings will be essentially invisible for nearly a month. (See "A Planet Without" above.) As noted, the small elongation from the Sun at this time makes observing Saturn difficult.

However, shortly after midnight on Sept. 3 (Eastern Time), another giant planet must also do without. *Jupiter will be without its Galilean satellites for nearly two hours*, as seen from Earth, an event that will not occur again until 2019 (Meeus 1997)!

Bright Jupiter will also be about forty-five degrees high over the south horizon in Florida making this gas giant easy to spot and observe throughout this special event.

At approximately 12:44 a.m. EDT, Ganymede will be last to disappear as it begins to move onto the Jovian disk. Europa will already lie on the disk (a *transit*), Io will be behind Jupiter (an *occultation*), while Callisto lies in the shadow of Jupiter (an *eclipse*). If you begin observing earlier, you can actually see Io begin its occultation by Jupiter about 11:43 p.m. EDT. Finally, one hour and 46 minutes later, about 2:30 a.m. EDT, Io will reappear first as it emerges from its eclipse by Jupiter's shadow.

While these events are not especially rare (25 in the 21st Century), the next time Jupiter will be without Galilean satellites is not until November 2019. So don't miss "Jupiter without satellites" or be prepared to wait ten years!

**A "Half-Storm" of Meteors (Nov. 17)** The November *Leonid Meteor Shower* is most often one of the weakest of the year. However, about every thirty-three years this shower sometimes brings a storm of meteors like no other, often with thousands of meteors for an hour or so. In 1966 observers in the Southwest USA recorded rates of 40–50 per *second* for about ten minutes. Spectacular shows were last seen in 1998 where some saw rates of 1,000–2,000 per hour. Good shows appeared for a few following years with 1999 and 2002 producing upwards of 3,000 per hour. Nevertheless, the Leonids have now seemed to return to "dormant" hourly levels of 15 or so with the next storm possibly not until 2032.

But wait!

*A strong outburst on November 17, 2008 hints that the 2009 Leonids may produce a shower rate of more than 500 per hour.* (Cooke 2008)! This suggests the Earth passed through a debris stream of Comet 55P/Temple-Tuttle producing about 100 meteors per hour in Asia and Europe. Since meteor observers consider 1,000 meteors per hour a "storm," the 2009 Leonids may produce a "half-storm" as noted by Jeremie Vaubaillon of Caltech, who has successfully predicted previous meteor outbursts.

On November 17, 2009, the Earth will again pass through this same comet debris stream, which may produce even higher rates during a few hours with the peak near 4:43 p.m. EST. Although this time again favors Asia and not Florida, *observers here should look for a better than average display during the early evening as the sky darkens.* (Sunset in Gainesville is about 5:30 p.m. EST.) The Moon will cooperate since she will have been in new phase the previous day and will shed no moonlight over the night sky.

**The Year Ends Blue (Dec. 31)** The year began with exquisite Saturn undressed without her glamorous ring system. *The year ends, however, with an extra full moon.* (Do you know if any months cannot have two full moons?)

The Moon is full December 2 at 2:31 a.m. EST. Colonial Americans sometimes referred to December's full moon as the "Christmas Moon" or the "Moon Before Yule." Nonetheless, she will again be full December 31 at 2:14 p.m. EST giving Floridians two full moons in the same calendar month. Some now call this second full moon a "blue moon." (An older definition is "a blue moon is the third of four full moons in a season" according to Sinnott, et al. 1999.)

While not exactly rare, blue moons average about once every 33 months (last was May 2007, next after 2009 is August 2012). Of course, we hope December's blue moon does not suggest 2009 will be a "blue" year!

Less important, note that May 2009 has two *first quarter* moons, May 1 and May 30. Can anybody suggest a name for this second first quarter moon in a calendar month?

Meanwhile, prepare for 2010 events. January 2010 opens with the next opposition of Mars on January 29. Unfortunately, this will not be a very favorable opposition of the red planet. The Martian disk will achieve an angular diameter of only 14 arc seconds across, paltry compared with its 25 arc second disk during the very favorable opposition of 2003. (The next best opposition is 2018 when Mars will grow to 24 arc seconds.)

If you know of other "special" astronomical events for 2009, write an article for *FirstLight* and tell our readers. (Send to [firstlight@floridastars.org](mailto:firstlight@floridastars.org).) ☼

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