

January in the skies

Begin your new year with celestial events, ranging from a potentially bright comet, visible planets in both the morning and evening skies, and the *Huygens* probe descent into the atmosphere of Saturn's moon, Titan.

Visible planets and exploration

As the winter Sun rises, four of the five visible planets, Mercury, Venus, Mars, and Jupiter, will be found over the eastern and southern horizons. The two inner planets, Mercury and Venus, will both rise about an hour ahead of the Sun and will be visible just above the southeastern horizon at sunrise for about the first half of January. Look for the dimmer Mercury to be just above the much brighter Venus. These two planets lie in very nearly the same direction from the Earth, and both will head toward superior conjunction with the Sun early next month as their respective orbital paths will take them behind the Sun and out of view for a while. Interestingly, both of these planets will display nearly the same moon-like phase appearance, the waxing gibbous phase, due to their position relative to the Earth and the Sun.

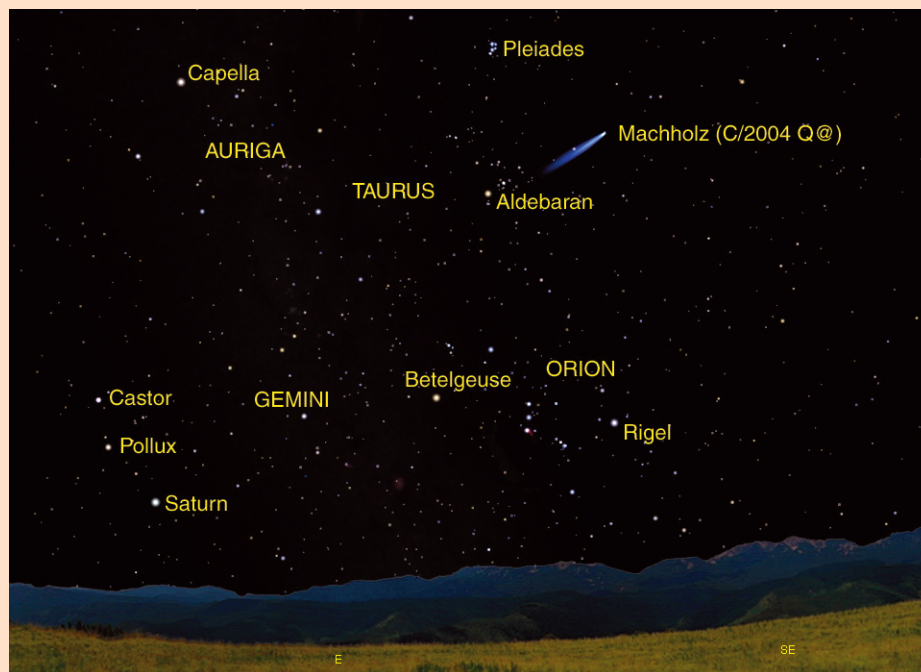
Mars, the red planet, will rise a couple of hours earlier than the two inner planets. By sunrise it will be located over the southern horizon, slightly east (left) of the brighter stars making up the constellation of Scorpius, the Scorpion. The brightest star in this constellation, Antares, is a reddish color similar to the reddish color of Mars. Perhaps named because of their similarities in appearance, Antares, coming from the words *anti* and *Ares* (the Greek god of war), means *rival of Mars*. Approximately every two years the Earth and Mars are closest to each other during opposition, when Mars will rise at sunset and set at sunrise. To an observer, opposition is a time when a planet is visible all night. Opposition this year will occur during the early part of November.

The largest planet in the solar system, Jupiter, will rise at about midnight local time and will be very high over the southern horizon at sunrise. About 10 degrees below Jupiter, and shining with about half the brilliance, is the blue-white star Spica. This is the brightest star within the constellation Virgo, the Harvest Maiden, and typically represents a bundle of wheat or grains held in the Maiden's left hand. Watch for the waning crescent Moon to pass by Jupiter on January 3 and rise very close to Spica on the morning of January 4.

Saturn will reach opposition this month and will be visible all night as it will rise at about sunset and set at about sunrise. This month, the *Huygens* probe, released from the *Cassini* spacecraft this past December, will travel across Saturnian space until it enters the atmosphere of the moon Titan on January 14. Early that morning, EST, the probe will encounter the moon's atmosphere and begin a 2.5-hour descent toward the surface.

FIGURE 1

View looking eastward at 9:00 p.m. EST. Comet Machholz may reach naked-eye brightness this month

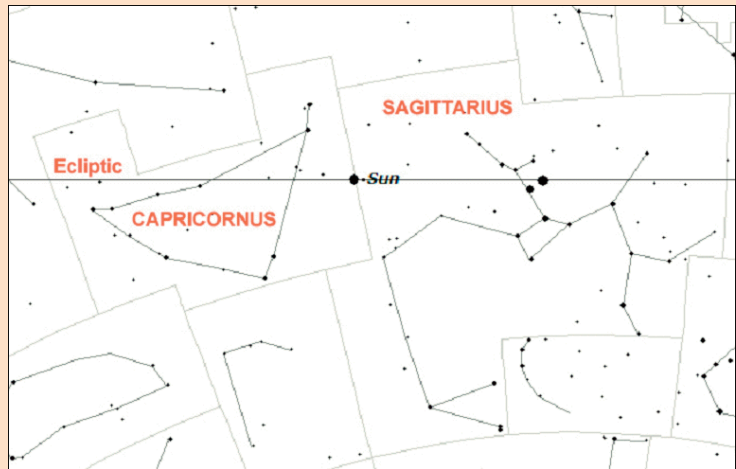


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Tracking the Sun

Throughout the school year, information and data will be provided through this column so students may indirectly follow the Earth along its orbital path, the *ecliptic*, around the Sun. Because from our perspective the Sun appears to be moving, students will actually be graphing the Sun's apparent motion caused by the Earth's real orbital and rotational motions. This graph-ready data will include the celestial coordinate position, the midday altitude of the mid-month Sun, its distance from the Earth, and the Sun's apparent size.

In addition to graphing the data provided each month, students may follow and plot the Sun's location along the ecliptic after downloading the free SFA star charts (see Resources).



January

During January, the Sun's apparent motion along the ecliptic takes it across the constellation Virgo, the Harvest Maiden; Libra, the Scales; Ophiuchus, the Healer; and into the boundaries of Scorpius, the Scorpion.

On this date at midday EST

| Date | Time of midday Sun | Distance (in AU) | Altitude | Apparent size | Right ascension | Declination |
|------|--------------------|------------------|----------|---------------|-----------------|-------------|
| 1/20 | 1:26 p.m. | 0.8941 | 31° 12' | 33' | 20h 12m | 19° 58' |

During this time, the probe will radio data to the *Cassini* spacecraft as it passes Titan.

During January, Comet Machholz (C/2004 Q2) may become bright enough to be visible to the naked eye or with binoculars under dark skies. Donald Machholz, Jr., discovered the comet this past August; this month it will be located within the constellation of Taurus, the Bull. If the comet becomes visible, you will be able to track it across the stars of the Pleiades on the evenings of January 12 and 13 (Figure 1).

Visible planets

- Mercury and Venus will be very close to each other and both will be visible over the southeastern horizon at sunrise during the first half of the month.
- Mars will rise a couple of hours before the Sun and will be visible over the southeastern horizon at sunrise.
- Jupiter will rise at about midnight local time and will be close to the bluish star Spica over the southern horizon at sunrise.

- Saturn will rise at sunset and will be visible all night, setting at sunrise.

Moon phases

January

| | |
|---------------|------|
| Last quarter | 1/3 |
| New Moon | 1/10 |
| First quarter | 1/16 |
| Full Moon | 1/25 |

Internet resources

- Gary Kronk's cometography—cometography.com/lcomets/2004Q2.html
- Mars Reconnaissance Orbiter—mars.jpl.nasa.gov/missions/future/2005-plus.html
- Cassini* Mission to Saturn—saturn.jpl.nasa.gov/home/index.cfm
- SFA star charts—www.cox-internet.com/ast305/SFAStarCharts.html
- Custom sunrise/sunset calendar—sunrisesunset.com/custom_srss_calendar.asp