Figure caption: One of the thousand-year-old pueblos in Chaco Culture National Historical Park in northwest New Mexico is pictured. Its longer sides are oriented to point to moonset at the minor lunar standstill. The knowledge of this orientation would have required decades of careful observation. This inspired the author to learn more about lunar standstills. Photo by the author.

Lunar Standstills **By John Schomburg**

What is a standstill? We are all familiar with solar standstills, known as solstices, which get their name from the Latin words for "Sun" and "to stand still". Two of these occur each year, around June 20 and December 20. These are the highest and lowest points of the Sun at noon in our sky. When the Sun gets to one of these points, it pauses, and reverses course. No, the Sun doesn't really stop in the sky! It keeps whizzing by each day, but it gets a little higher or lower on each pass. Except at the standstills.

The Moon does something similar, but it's not quite as obvious. The full Moon is higher in winter but the maximum height changes. You may have noticed how high the full Moon was this winter, and how low it was last summer. That is because we are approaching a major lunar standstill, where the extra height of the moon is really noticeable. This will be at a maximum early next year, but it's still pretty good over a period of a couple years.

What makes a lunar standstill, and what makes it 'major'?

If Earth’s rotation axis were pointed "straight up" as it circles the Sun, we would have no solstices, and no seasons, and the full moon height would never change. The Earth is actually tipped about 23 degrees, and the north pole always points in the same direction, toward the North Star. So at one point in our trip around the Sun, we're tipped toward the Sun (summer), and on the opposite side of the Sun we're tipped away (winter).

The Moon's orbit around Earth is also tilted, about 5 degrees from "straight up" as far as the Sun is concerned. That is what changes the maximum height of the full moon. But why don't we see the same thing year after year?

It turns out that the direction of the tilt of the Moon's orbit moves around in a circle! This takes about 18 years. So these two tilts of the Earth and Moon's orbit work together. Sometimes they add up, and sometimes they subtract.

What makes a standstill 'major' is when the maximum tilts of the Earth and Moon line up, every 18 years, so the full Moon gets really high or low, further than the Sun ever gets.

There is also a 'minor' lunar standstill, but it's not quite as obvious to the casual observer. It occurs when the Moon's orbital tilt lines up to subtract as much as possible from that of the Earth's tilt. But then the Moon is still well within the Sun's stomping grounds so we don't notice it. These also occur every 18 years, between the major lunar standstills.

One of the striking effects of a major lunar standstill is that the Moon rises and sets far more to the north than the Sun in the summer, and more to the south in the winter. This effect was noticed thousands of years ago and some ancient monuments and buildings were even constructed to line up with moonrise and moonset points for both major and minor standstills!

After being so high in the night sky this winter, the full Moon will be very low again this summer. And it will be even more extreme next year!

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