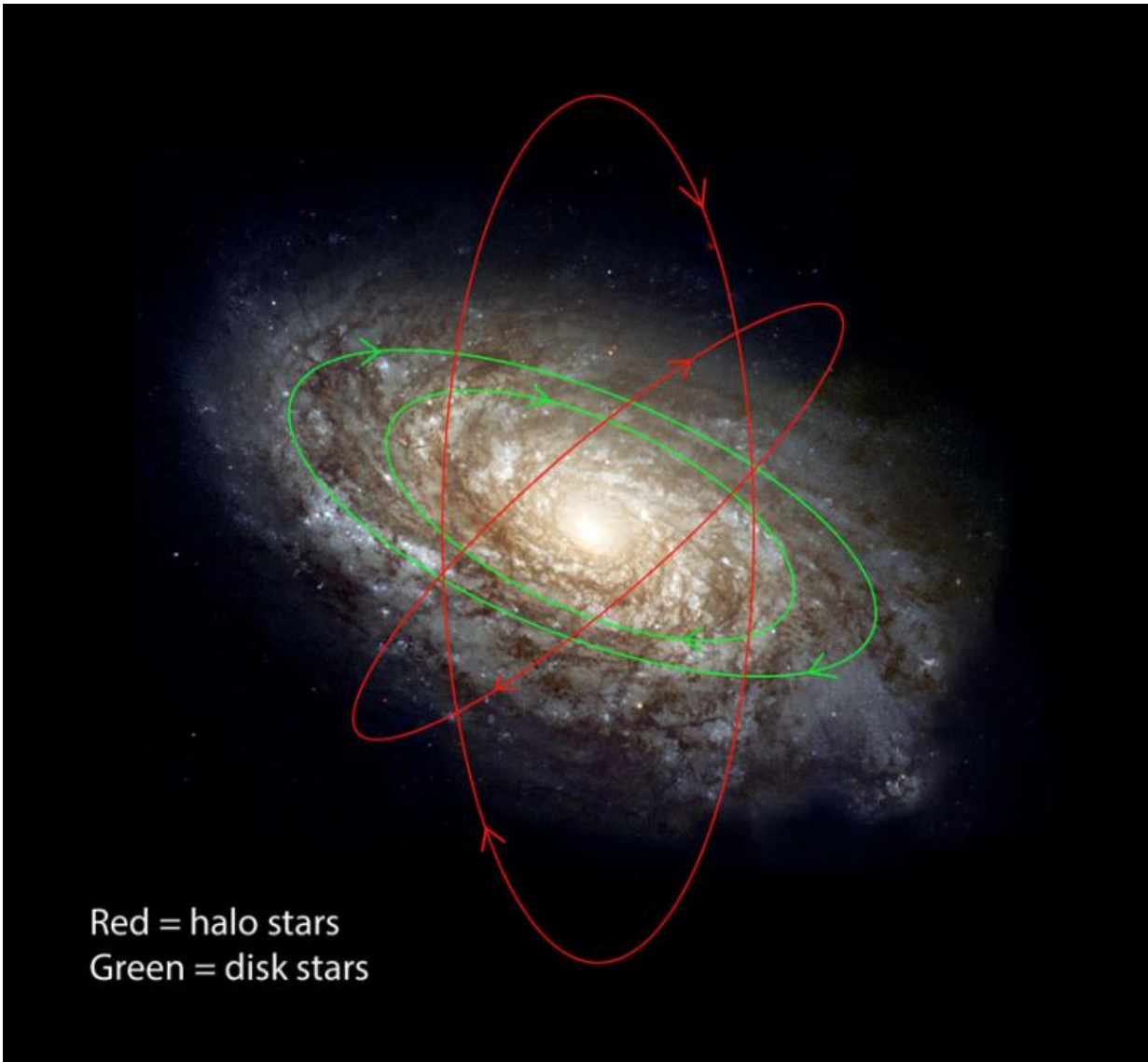


# The Big Dipper in the year 92,000

September 13 2016, by Bob King



NGC 4414 is a spiral galaxy that resembles our own Milky Way. I've drawn in the orbits of several stars. Both disk and halo stars orbit about the center, but halo stars describe long elliptical orbits that take them well beyond the disk.

When a star plunges through the disk, if it happens to be relatively nearby as in the case of Arcturus, the star will appear to move relatively quickly across the sky. Both distance and the type of orbit a star has can affect how fast it moves from our perspective. Credit: NASA/ESA with orbits by the author

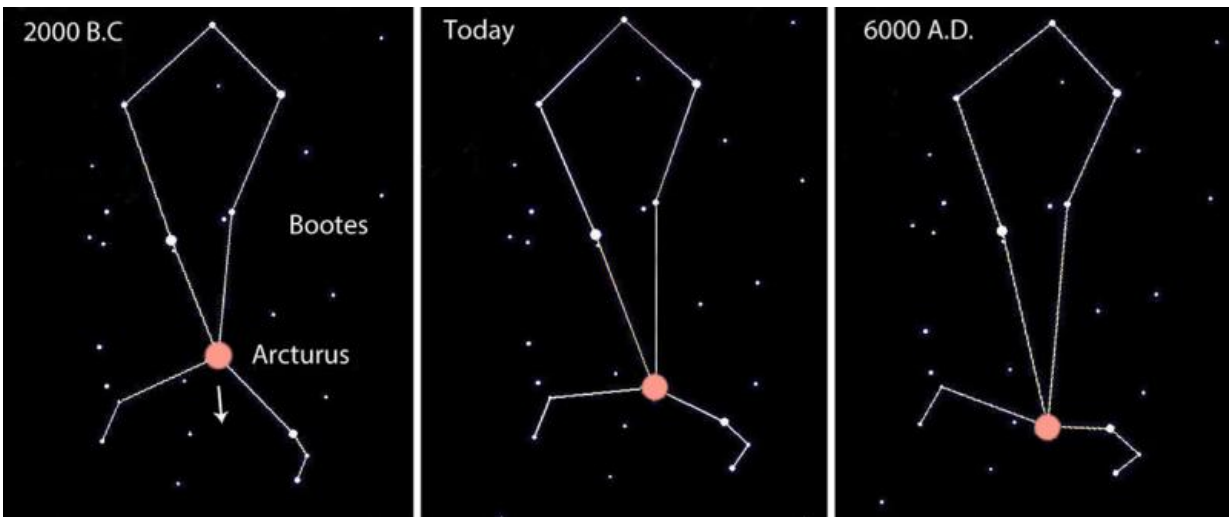
You go out and look at the stars year after year and never see any of them get up and walk away from their constellations. Take a time machine back to the days of Plato and Socrates and only careful viewing would reveal that just three of the sky's naked eye stars had budged: Arcturus, Sirius and Aldebaran. And then only a little. Their motion was discovered by Edmund Halley in 1718 when he compared the stars' positions then to their positions noted by the ancient Greek astronomers. In all three cases, the stars had moved "above a half a degree more Southerly at this time than the Antients reckoned them."

Stars are incredibly far away. I could throw light years around like I often do here, but the fact is, you can get a real feel for their distance by noting that during your lifetime, none will appear to move individually. The gems of the [night](#) and our [sun](#) alike revolve around the [center](#) of the galaxy. At our solar system's distance from the center—26,000 light years or about halfway from center to edge—it takes the sun about 225 million years to make one revolution around the Milky Way.

That's a LONG time. The other [stars](#) we see on a September night take a similar length of time to orbit. Now divide the average lifetime of some 85 years into that number, and you'll discover that an average star moves something like .00000038% of its orbit around the galactic center every generation. Phew, that ain't much! No wonder most stars don't budge in our lifetime.

Sirius, Aldebaran and Arcturus and several other telescopic stars are

close enough that their motion across the sky becomes apparent within the span of recorded history. More powerful telescopes, which expand the scale of the sky, can see a great many stars amble within a human lifetime. Sadly, our eyes alone only work at low power!



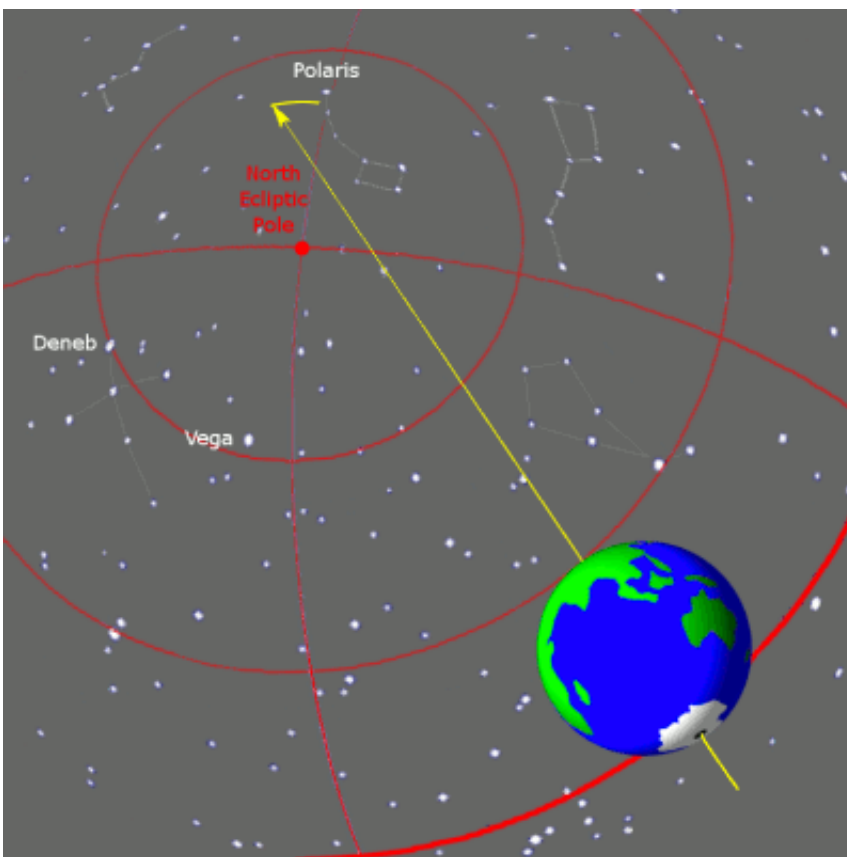
This graphic, made using SkyMap software created by Chris Marriott, shows the motion of Arcturus over a span of 8,000 years.

But we needn't invest billions in building a [time machine](#) to zing to the future or past to see how the constellation outlines become distorted by the individual motions of the stars that compose them. We already have one! Just fire up a free sky charting software program like Stellarium and advance the clock. Like most such programs, it defaults to the present, but let's look ahead. Far ahead.

If we advance 90,000 years into the future, many of the constellations would be unrecognizable. Not only that, but more locally, the precession of Earth's axis causes the polestar to shift. In 2016, Polaris in the Little

Dipper stands at the northernmost point in the sky, but in 90,000 years the brilliant star Vega will occupy the spot. Tugs from the sun and moon on Earth's equatorial bulge cause its axis to gyrate in a circle over a period of about 26,000 years. Wherever the axis points defines the polestar.

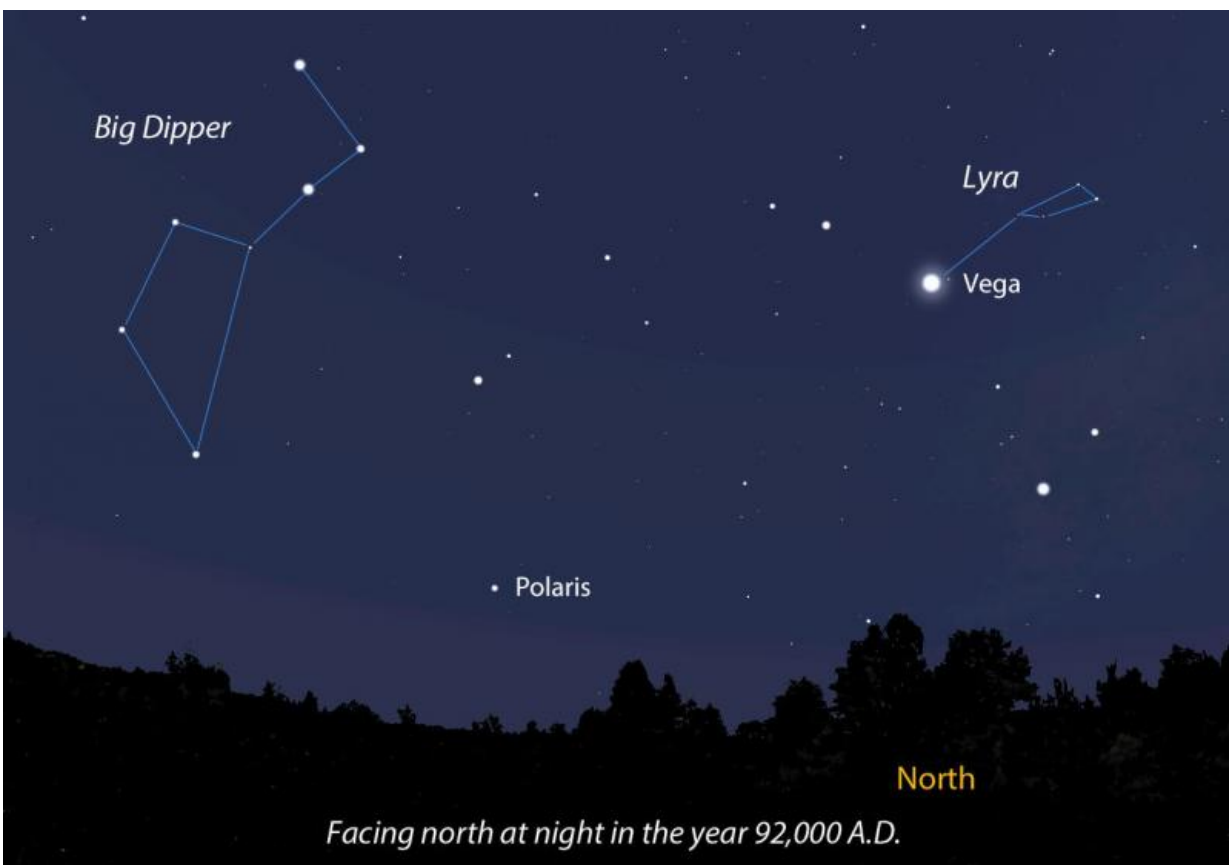
Take a look at the Big Dipper. Wow! It's totally bent out of shape yet still recognizable. The Pointer Stars no longer quite point to Polaris, but with some fudging we might make it work. Vega stands near the pole, and being much closer to us than the rest of Lyra's stars, has moved considerably farther north, stretching the outline of the constellation as if taffy.



Precession of Earth's axis maintains its usual 23.5 degree tilt, but it causes the axis to describe a circle in the sky like a wobbling top. The photo is an animation

that repeats 10 seconds, so hang in there. Credit: Wikimedia Commons

Time goes on. We look up at the night sky in the present moment, but so much came before us and much will come after. Constellations were unrecognizable in the past and will be again in the future. In a fascinating discussion with Michael Kauper of the Minnesota Astronomical Society at a recent star party, he described the amount of space in and between galaxies as so enormous that "we're almost not here" in comparison. I would add that time is so vast we're likewise almost not present. Make the most of the moment.



Visualizing how radically the Big Dipper changes shape over time. Notice too

that Vega will be the polestar in that distant era. Map: Bob King, Source: Stellarium



92,000 years to 90,000 B.C. The Dipper then was fairly unrecognizable, with both Vega and Arcturus near the pole. Credit: Map: Bob King , Source: Stellarium

Source: [Universe Today](#)

Citation: The Big Dipper in the year 92,000 (2016, September 13) retrieved 10 April 2024 from

<https://phys.org/news/2016-09-big-dipper-year.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.