

WANT TO VIEW A GREAT SUMMER SPECTACLE?

Take in Wyoming's ultimate drive-in theater

Travis Laurence

Now is a wonderful time to stay up late, go outside, and see some of the amazing summer stars and constellations.

Something that might catch your wonder is the bright band of light we call the Milky Way. The farther you can get from city lights, the more obvious this pale, diffuse band becomes. You are looking at part of the galaxy in which we live.

Our galaxy is a massive collection of 200 billion to 400 billion stars. All of the stars you see in the night sky are part of the Milky Way. About 3,000 of these stars can be seen on a clear night. That is a lot of stars!

But what we see with our eyes is only a tiny fraction of the stars within our galaxy.

The Milky Way is also somewhat flat in that the thickness is small compared to the diameter. Our galaxy is between 100,000 to 150,000 light-years across and only a paltry 1,000 light-years thick. One light-year is about 6 trillion miles. You are looking at this 1,000 light-year plane of the galaxy. Most of the stars are too far away for our eyes to resolve.

A pair of binoculars or a small telescope allows us to see so much more in the Milky Way.

You might notice dark regions within the band of light of the Milky Way. These are called dark nebula and are clouds of interstellar dust. Astronomers use the term "interstellar dust" to describe tiny particles of matter found throughout space. These dust clouds may be light-years in size and contain material that some day may be formed into stars and planets. They absorb light from those millions of unseen stars behind them.

In effect, you can get a sense of depth if you see a star within a dark nebula. The star is in front of the cloud, and behind the cloud is light from the Milky Way. Stars within the constellation Cygnus (described below) are a great example of this.

Summer Travelers

As summer comes so do three stars – Vega, Altair, and Deneb – that straddle the Milky Way and form the Summer Triangle. These stars in early summer are in the east after sunset and, as summer progresses, will progress from east to west, so in mid-summer they will be close to straight overhead at sunset.

The Summer Triangle is not an official constellation, as these stars all lay within their own distinct constellations.

Vega is the brightest of the three and is one of the brightest stars in the sky. It is in the constellation Lyra, which is most easily imagined as a harp. Vega is a white star, which means it is very hot, around 10,000 degrees at its surface. Our yellow sun is around 6,000 degrees at its surface. Vega is twice as massive as the sun and about 40 times brighter. Vega is relatively close – around 30 light-years from us.

The second brightest star is **Altair**, which is in the constellation Aquila the Eagle. Altair is even closer than Vega to us, lying at a distance of around 16 light-years. It is about twice as massive as our Sun.

Deneb, the faintest star in the Summer Triangle, is actually the largest and brightest of the three. Deneb is over 2,000 light-years away from us, is 20 times more massive than our sun, and over 200,000 times brighter! Deneb would extend out almost to Earth with Mercury and Venus inside if substituted for the sun.

Deneb is in the constellation Cygnus the Swan. Cygnus is also known as the Northern Cross in contrast to a constellation called the Southern Cross visible in the southern hemisphere.



Dolphins, Scorpions

To the east of the summer triangle is a small and faint constellation called **Delphinus** the Dolphin. This constellation is nice in that (to me at least) it actually looks like a dolphin. You can imagine her jumping out of the Milky Way and flipping her tail through space.

Follow the Milky Way south and you can find two interesting constellations low on the horizon. **Scorpius** starts in the Milky Way and extends toward the west. Scorpius is a scorpion that bested the mighty Orion when they were both on Earth. Every summer when Scorpius rises, Orion flees until the scorpion is no longer in the sky.

An interesting star in Scorpius is **Antares**. This bright-red star represents the heart of the scorpion and is also very similar in color and brightness to Mars. Scorpius is a

zodiac constellation in that the path of the sun passes through this constellation. Because our sun and planets lie within a fairly flat plane, the planets also pass through this constellation. Mars (aka Ares) can sometimes be found right next to Antares, hence the name Antares,

which can translate to “Not-Mars” or “Rival of Mars.”

There is a planet in this area slightly west of Scorpius, very pale yellow in color and slightly dimmer than Antares. This is Saturn, the farthest planet we can see with our eyes.

Beautiful Rings

Saturn will spend our summer just ahead of Scorpius’ claws. As the year progresses, Saturn will slowly move farther from Scorpius. The stars in the night sky seemed to be fixed in their relative positions – the constellations seem to retain their shapes over time. However, ancient astronomers noticed these objects such as Saturn that moved throughout the constellations. They called these objects “wandering stars,” which in Greek is *asteres planetai*, hence we call them planets.

The constellation **Sagittarius** is east of the scorpion. Sagittarius is a centaur with a bow and arrow, but most people know this constellation by its unofficial name, the **Teapot**. This representation works great if you imagine the Milky Way as steam coming out of the spout.

You might notice the Milky Way looks rather spectacular in this direction toward the center of our galaxy. It is wide and bright, full of milky patches and dark clouds.

Big, Very Big Black Hole

The galactic center lies within a dark nebula just above the spout of the Teapot. The center of our galaxy is estimated about 24,000 to 28,000 light-years away from us. Astronomers believe there is a super-massive black hole at the center.

Black holes have enough mass that light is not moving fast enough to escape. Think about throwing a



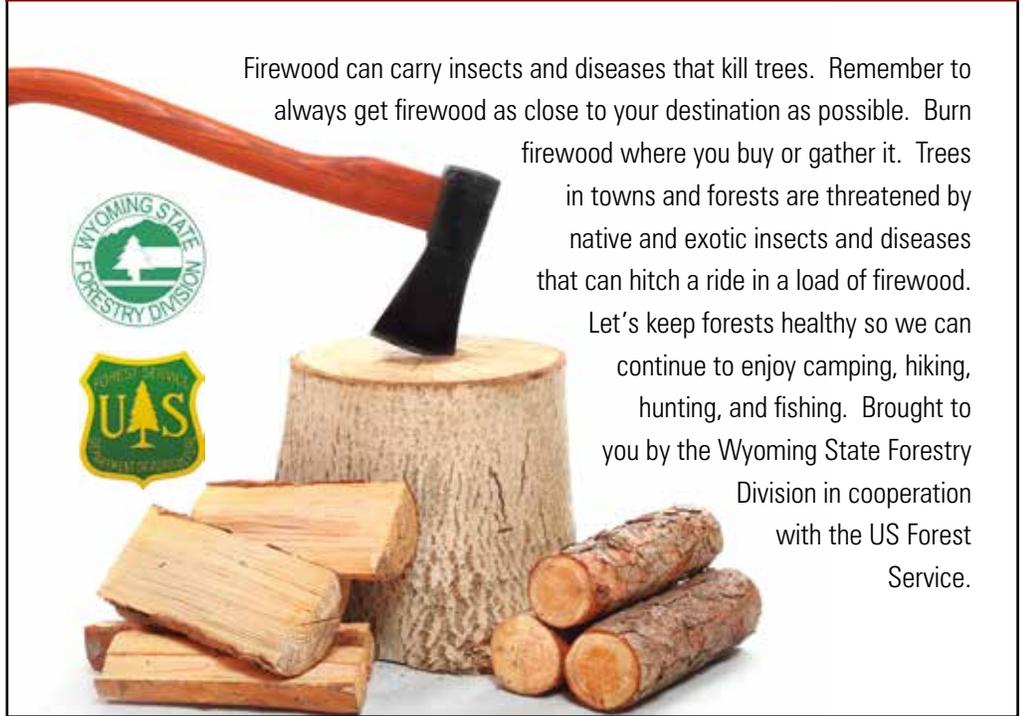
There are no Unidentified Space Objects in **Travis Laurance’s** vocabulary. He is the laboratory coordinator in the Department of Physics and Astronomy at the University of Wyoming. He can be reached at (307) 766-4371 or at travis@uwyo.edu.

ball into the air. It comes back to the surface every time because we cannot throw it fast enough to escape Earth's gravity. A black hole is so massive that the fastest moving thing we know of, light, falls back to the surface.

The black hole at the center of our galaxy is estimated to be over 40 million times the mass of our sun. This much mass affects objects around it; that's how we know the black hole exists. Astronomers see stars orbiting around nothing, but that nothing must be a massive object.

The summer night sky is full of wonders and beautiful objects. Whether you simply enjoy the splendor of the Milky Way overhead or find wonder in realizing you might be looking toward the center of our galaxy 26,000 light-years away, the summer night sky in Wyoming is worth staying up for.

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