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August 12–13, 2019: The Perseid Meteor Shower

Even casual skywatchers know about the Perseid meteor shower, because it can deliver at least one meteor per minute under pleasant summer skies. But the shower's peak performance is relatively brief, so timing is important.

A bright Perseid meteor streaked down on August 7, 2010, over buildings at the Stellafane amateur astronomy convention in Springfield, Vermont. Click here for a larger image.
Dennis di Cicco

The shower's maximum should come early on Tuesday, August 13th. Sadly, the Moon will be big and full that night, so you'll only get to see the brightest Perseids. Still, meteor expert Peter Jenniskens predicts that a strong pulse of Perseids might appear near 2^h UT on the 13^{th} (10:00 p.m. EDT on the 12^{th}), which is not long after dark for those in eastern North America. By then the shower's radiant (near the Double Cluster in Perseus) should have cleared the northeastern horizon. That's also when you'll most likely see bright fireballs that skim Earth's atmosphere and create long, dramatic streaks in the sky. Perseid meteors are visible for about 12 days on

either side of the August 13th peak. So, don't let moonlight or cloudy skies on the 13th end your chances to observe these pieces of comet debris.

These meteors are bits of debris shed by Comet 109P/Swift-Tuttle, which orbits the Sun every 130 years. Careful observers first realized that the Perseids are an annual event in the 1830s.

What is a Meteor Shower?

The Perseid meteor shower is so named because even though its "shooting stars" can appear anywhere in the sky, their streaks can all be traced back to the constellation Perseus. *Sky & Telescope diagram*

Meteors can occur at any time on any night and appear in any part of the sky. On a dark, moonless night you might see a half dozen of these *sporadic* (random) meteors per hour. However, whenever Earth encounters a stream of gritty debris left in space by a passing comet, the result is a *meteor shower*.

You'll notice the difference if you watch the sky for a half hour or so during one of these events: not only do the number of meteors you'll see go up, but also the meteors seem to fly away from a common point in the sky called the *radiant*.

This is a trick of perspective, because all these particles are traveling in parallel — part of a vast but sparse "river of rubble" that's spread all around the comet's orbit. To get a better sense of this, check out the interactive animation at the link below, which is part of a set created by Ian Webster. It shows particles along the orbit of Comet 109P/Swift-Tuttle, which is the comet responsible for the Perseid meteor shower. (Have some fun with it: click and drag to get different perspectives): Interactive animation of debris from Comet 109P/Swift-Tuttle

So, What are Meteors?

If you look up into a dark, Moonless night sky from a location far from city lights, you'll see brief streaks from *meteors* a few times every hour. These "shooting stars" can range in brightness from tiny blips just at the limit of visibility to dramatically bright *fireballs* that outshine Venus and light up the nightscape around you. The rarest of these, called a *bolide,* shatters into pieces during its rapid descent.

The little nuggets in Grape-Nuts cereal are a close match to the size of particles that typically create meteors in our atmosphere.

Derived from the Greek word *meteoros* (meaning "high in the air"), meteors are bits of interplanetary debris that slam into Earth's upper atmosphere at speeds of 30 to 70 km (20 to 45 miles) *per second!* And although some meteors look bright enough that it seems you can almost touch them, they actually occur very high up, at altitudes of 80 to 120 km (50 to 75 miles).

Because they're arriving so fast, it doesn't take a very large particle to make a dramatic flash. Typically, they're no bigger than big sand grains, and something the size of a pea can create a meteor that's dramatically bright. Those high velocities give each particle a lot of kinetic energy, which converts to heat due to friction in the upper atmosphere.

Many people think a meteor occurs because the particle is "burning up." But friction actually flash-heats air molecules along the particle's path to thousands of degrees. The air molecules cool down in just a split second, giving off light as they do so.