News Archive 2009

What are shooting stars?

Week 46

Photograph of a shooting star – known to scientists as a meteor

A bright line of light appears across the night sky – and popular wisdom would have us believe that any person witnessing a shooting star is entitled to make a wish. With eyes closed, that person must then make their wish, but not tell anyone else what it is. Science also takes an interest in these optical phenomena in the atmosphere, and calls them meteors. These arise whenever minute particles – known as meteoroids – collide with Earth's atmosphere and burn up in the friction and heat resulting from that high-speed collision. In the process, molecules from the meteoroid are ionised along its flight path, causing them to glow – so, for a short time, a luminous trail is visible across the sky. This phenomenon usually takes place at altitudes of between 80 and 120 kilometres.

These meteoroids, usually no more than a millimetre in diameter, originate from asteroids and comets. Most commonly, meteors occur sporadically and in isolation. Sometimes, though, meteor showers occur, when more than 100 shooting stars per hour can often be observed. What causes this to happen?

For the most part, meteor showers are caused by comets that move close to the plane of Earth's orbit around the Sun (the 'ecliptic' plane). Whenever these comets approach the Sun, their surface ice starts to evaporate, ejecting particles of dust in the process. These particles then distance themselves from the core of the comet and commonly arrange themselves in a tube-shaped cloud. Whenever the Earth approaches one of these clouds of particles, a large number of the particles collide with Earth's atmosphere and burn up to create 'shooting stars' or, more accurately, to form meteors.

A meteoroid can give rise to a meteor, which then falls to Earth as a meteorite

Due to the fact that the orbits of comets around the Sun virtually never alter, encounters of this nature occur at regular intervals at certain times of year. The best-known meteor showers are the Perseids (around 12 August – dust from comet Swift-Tuttle), the Leonids (around 17 November – dust from comet Tempel-Tuttle) and the Geminids (around 13 December – dust from the object '3200 Phaethon',

though to be an extinct comet). If a larger meteoroid fails to burn up completely in the atmosphere, and then reaches the surface of Earth as a solid body, this is referred to as a meteorite.

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