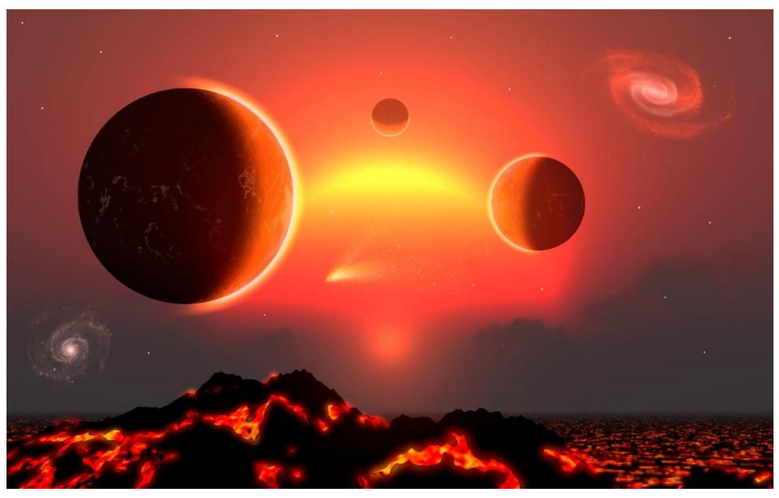
When And How Will Our Sun Eventually Die?

Quora Contributor
Consumer Tech



Will the sun ever stop shining? originally appeared on Quora: the place to gain and share knowledge, empowering people to learn from others and better understand the world.

Answer by Viktor T. Toth, IT pro, part-time physicist, on Quora:

The sun will not stop shining for a very, very long time.

The Sun, along with the solar system, is approximately 4.5 billion years old. That is about one third the age of the entire Universe.

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For the next several billion years, the Sun is going to get brighter. Perhaps paradoxically, this will eventually result in a loss of carbon dioxide in the Earth's atmosphere, which is not good news; it will eventually lead to the death of plant life.

By 2.5–3 billion years from now, the surface temperature of the Earth will exceed the boiling point of water everywhere. The process continues; by about 4–5 billion years from now, the Earth will be in worse shape than Venus today, with most of the water gone, and the planet's surface partially molten.

Eventually, the Sun will evolve into a red giant star, large enough to engulf the Earth. Its luminosity will be several thousand times its luminosity at present. Finally, with all its usable nuclear fuel exhausted and its outer layers ejected into space, the Sun's core settles down into the final stage of its evolution as a white dwarf. Such a star no longer produces energy through nuclear fusion, but it contains tremendous amounts of stored heat, in a very small volume (most of the mass of the Sun will be confined to a volume not much larger than the Earth). As such, it will cool very, very slowly. It will take many more billions of years for it to cool from an initial temperature of hundreds of thousands of degrees to its present-day temperature and below. But in the end, the remnant of the Sun will slowly fade from sight, becoming a brown dwarf: a cooling, dead remnant of a star.

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