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ASTRONOMY

Sun's rays put even tiniest particles under pressure

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BY TOM STATLER

Solar energy shining on the Earth amounts to about 1,300 watts per square meter. That can roast you to an embarrassing shade of pink.



And it exerts a force of a couple millionths of a pound on you.

For small objects orbiting our sun, such as comets, asteroids and bits of interplanetary dust, the pressure of light really matters. A grain of dust whizzing around the sun feels sunlight coming from a bit in front of it, the same way a runner gets a wet face in a straight-down rain.

The force of light slows the dust grain, sending it slowly spiraling into the sun. A 10-mile-wide asteroid responds a little differently. Its surface absorbs solar energy and stays warm for a while.

As the asteroid spins, the warmest spot on its surface gets carried slightly past the point of "high noon." Like any warm object, that spot radiates infrared light into space.

And every photon of light ejected from the surface kicks back a little. That light-pressure recoil acts like a miniature infrared rocket. This subtle mechanism is called the Yarkovsky effect, in honor of the Russian engineer who discovered it.

Over millions of years, it can change the orbit of an asteroid and send it onto a destructive collision course -- with something other than the Earth, we would hope.

Actually, every little piece of the asteroid's surface radiates in its own way. That can slowly change the spin of the asteroid, possibly accelerating it to the point where it breaks apart.

Just this year, astronomers have observed the Yarkovsky spin-up of asteroids for the first time. Nobody's seen one come apart yet, but we're looking for those objects teetering on the fragile edge.

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