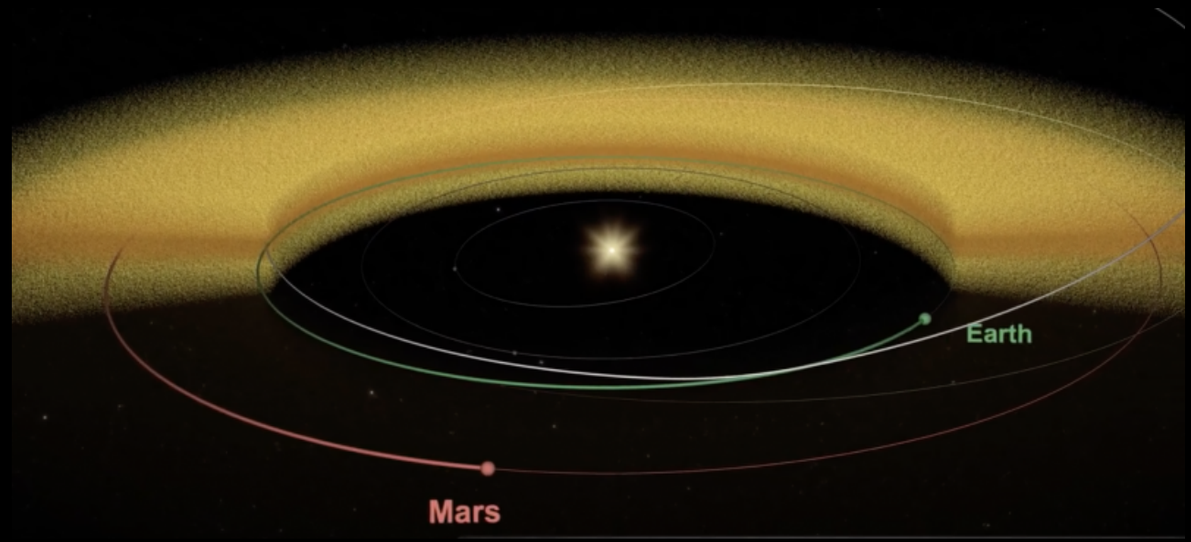
Juno Spacecraft Doubles as an Interplanetary Dust Detector

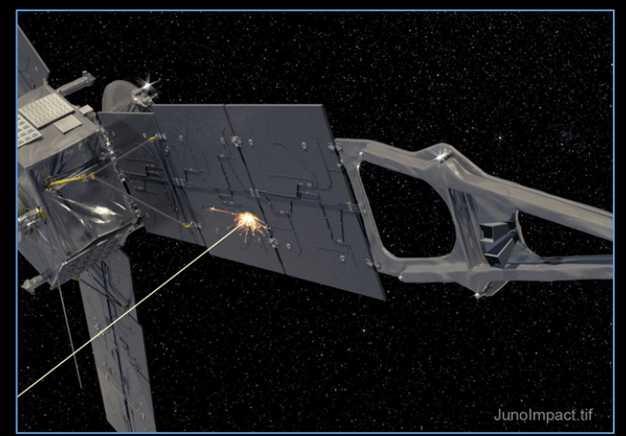
An instrument aboard the Juno spacecraft serendipitously detected dust particles slamming into Juno's solar panels during its journey from Earth to Jupiter. The impacts provide important clues to the origin of a dust cloud in the plane of the inner solar system that reflects sunlight, creating the "zodiacal light" that illuminates the plane of our solar system, and traces the origin of the dust to an unexpected source: Mars.

Star tracking cameras on Juno's magnetometer started registering thousands of streaks of light –paths of tiny particles knocked off the large solar panels by bits of dust traveling at about 10,000 mph (the panels were not damaged as the dust hit the back, not the sensitive front of the panels). The majority of the hits were recorded between earth and the asteroid belt, with boundaries defined by the gravitational influence of earth on one end and Jupiter on the other. The clear gravity barriers of this cloud suggest that the dust particles are in nearly circular orbits around the sun, and the only large object in a similar orbit in that area is the planet Mars.

While there is good evidence that Mars, the dustiest planet we know of, is the source of the zodiacal light, scientist cannot yet explain how the dust escaped Martian gravity. In the meantime, finding the true distribution and density of dust particles in the solar system will help engineers design spacecraft to better withstand dust impacts. Knowing the precise distribution of dust may also guide the design of flight paths for future spacecraft in order to avoid the highest concentration of particles.



A diagram of the area of the detected dust, with the orbits of Earth and Mars. The white arc is the path of Juno on its way to Jupiter.



Ejecta was observed from impacts with interplanetary dust & the Juno solar arrays

Jorgensen, J. L. et al., (2020), *Journal of Geophysical Research – Planets, 125, e2020JE006509.*