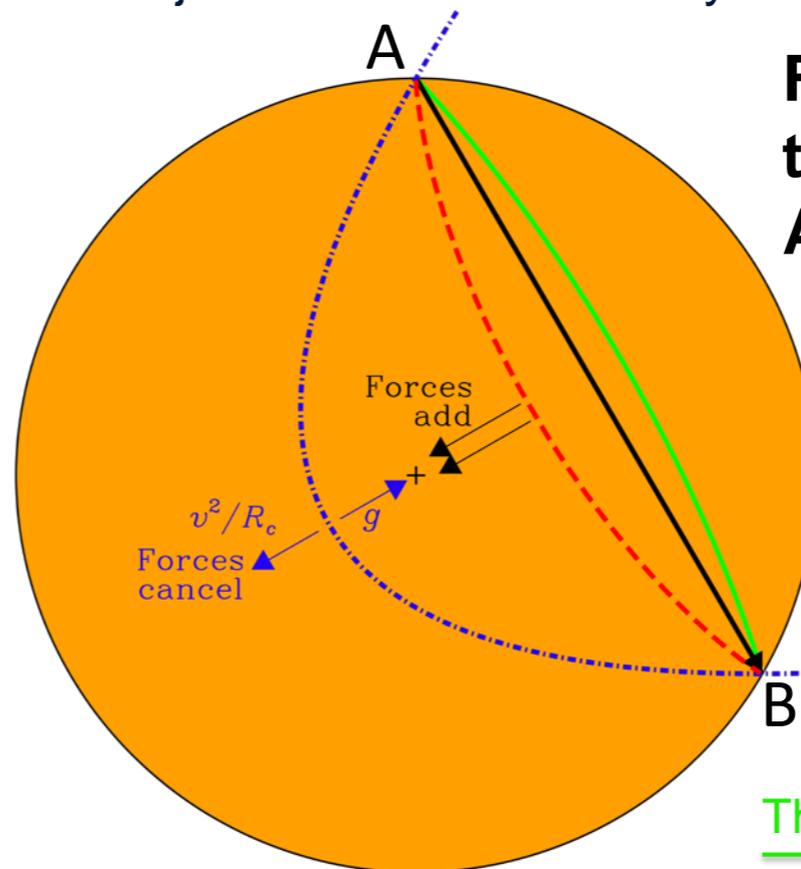


Flying Through the Sun

What is the science question? The Sun is a big ball of gas that gets more dense as you move inward. What do orbits look like that fly through this constantly changing environment?

What were your findings? We use numerical models that describe the interior of planets and stars to calculate how orbits change as they enter an area of constantly changing mass density. Trajectories through objects with a low central condensation of matter have a slight focusing effect. With a random distribution of orbits entering the planet, there are points where these objects will collect as they emerge on the other side.

What was the impact? These equations can model the motion of quarks, of stars moving through a globular cluster, or even WIMPs of dark matter passing through the Sun. The slight focusing effect observed in the models could increase the flux of WIMPs from a distant source and increase the probability of their detection on Earth.



Four theoretical paths through the Sun to get from A to B

G-forces would rip the satellite apart

Only possible if the Sun is a point

Requires a large amount of energy

The fastest way to travel through the Sun

Why does it matter to non-scientists?

We may never send a satellite to fly through the Sun, but the same mathematical models tell us how objects pass through clouds or through galaxies. Knowing how something moves is key in understanding where it came from and why our universe looks the way it does.

Amalia Gjerloev (671) and W. Dean Pesnell (671). 2017: "Orbits Through Polytropes," *American Journal of Physics*, accepted for publication.