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ASTRONOMY

Mercury's slight wobble indicative of molten core

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BY TOM STATLER

If you lived on Mercury, you wouldn't enjoy it. Nothing to breathe, nothing to drink, hot enough to vaporize your shoes. But at least you would be able to do one thing you can do on Earth.

You could navigate with a compass.

Like Earth, Mercury has a magnetic field. Why it does has been a puzzle. Earth's magnetic field arises in its molten, metallic core. Mercury is small enough that, left to itself, it should have cooled off and solidified.

No molten core, no magnetic field.

But a clever experiment to measure Mercury's spin, detailed in the May 4 issue of the journal *Science*, shows otherwise.

Mercury spins three times for every two orbits it makes around the sun. This synchrony is a natural result of tides, which means that the side of Mercury facing the sun gets pulled harder by the sun's gravity.

Because Mercury's orbit is elliptical, every time it swings around its nearest point to the sun, it gets an extra tidal twist and picks up a slight wobble. The size of that wobble tells us whether the planet is responding like a solid rock.

Measuring the spin accurately enough to tell the difference took international teamwork and three of the largest radio antennas in the world.

The key was to flood the planet with a powerful radar signal, and then watch for the reflections with two antennas at the same time, one in California and the other in West Virginia.

It's a bit like shining a spotlight on a spinning disco ball. The flash of light you see glinting off the ball sweeps past your friend a second later.

For brief moments, exactly the same radar reflection from Mercury swept past the California and West Virginia antennas. Careful timing let the astronomers calculate the exact rotation rate of the planet.

They found that the size of the wobble was bigger than a solid planet should show, but just what was expected if Mercury has a molten interior.

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