

Saturn's tilting axis

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In news: Recently, the scientists from the CNRS, Sorbonne University and the University of Pisa have reported that tilt of the rotation axis of the gas giant Saturn may in fact be caused by its moons

Key findings

- According to researchers, the tilt of the rotation axis of the gas giant Saturn may in fact be caused by its moons
- The current tilt of Saturn's rotation axis is caused by the migration of its satellites, and especially by that of its largest moon, Titan.
- Movement of moons: The most recent observation show that Titan and the other moons are gradually moving away from Saturn much faster than astronomers had previously estimated
- By incorporating this increased migration rate into their calculations, the researchers concluded that this process affects the inclination of Saturn's rotation axis: as its satellites move further away, the planet tilts more and more.
- Double inclination: Saturn's axis is still tilting, and what we see today is merely a transitional stage in this shift. Over the next few billion years, the inclination of Saturn's axis could more than double.
- The event that tilted Saturn is thought to have occurred relatively recently. For over three billion years after its formation, Saturn's rotation axis remained only slightly tilted.
- It was only roughly a billion years ago that the gradual motion of its satellites triggered a resonance phenomenon that continues today: Saturn's axis interacted with the path of the planet Neptune and

gradually tilted until it reached the inclination of 27 degrees observed today

- Scientists already are in agreement about the existence of this resonance but it was so far believed that it had occurred very early on, over four billion years ago, due to a change in Neptune's orbit.
- Since that time, Saturn's axis was thought to have been stable.

About Saturn

- Saturn is the sixth planet from the Sun and the second-largest in the Solar System, after Jupiter.
- Saturn is probably best known for the system of planetary rings that makes it visually unique
- It is a gas giant with an average radius of about nine times that of Earth.
- It only has one-eighth the average density of Earth; however, with its larger volume, Saturn is over 95 times more massive.
- Saturn is named after the Roman god of wealth and agriculture; its astronomical symbol (♄) represents the god's sickle.
- The Romans named the seventh day of the week Saturday, *Sāturni diēs* ("Saturn's Day") no later than the 2nd century for the planet Saturn.
- Saturn's interior is most likely composed of a core of iron–nickel and rock (silicon and oxygen compounds)
- Saturn has an axial tilt of almost 27 degrees, which is slightly larger than that of Mars.
- But when talking about a gas giant in the outer reaches of the solar system, the concept of seasonal change doesn't quite mean the same as on Earth.
- Seasonal variations are strong on Saturn and each season lasts more than 7 years.
- **Its moons:** At least 82 moons are known to orbit Saturn, of which 53 are officially named; this does not include

the hundreds of moonlets in its rings.

Titan, Saturn's largest moon, and the second-largest in the Solar System, is larger than the planet Mercury, although less massive, and is the only moon in the Solar System to have a substantial atmosphere

About CNRS

- The French National Centre for Scientific Research (French: Centre national de la recherche scientifique, CNRS)
- It is the largest fundamental science agency in Europe.