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Hillsdale College Professor Helps Discover Precise Center of Solar System

Findings will help researchers better calibrate instruments to study black holes

HILLSDALE, Mich.— Hillsdale College Assistant Professor of Physics Dr. Timothy Dolch co-authored a paper in *The Astrophysical Journal* that pinpoints the gravitational center of our solar system.

The team used specially designed software called BayesEphem to narrow down the precise location of the solar system’s gravitational center, called the barycenter.

“We are very excited about these results,” said Dolch. “We now can use pulsars to pinpoint our exact place in the galaxy, information we need in order to find merging supermassive black holes.”

The software models show that the exact barycenter of our solar system is not in the middle of the sun, but rather toward its edge. The reason for this is that the planets and other objects in our solar system, Jupiter especially, exert their own gravitational force, which counterbalances the gravitational influence of the sun.

The findings are useful for many scientific purposes, but the team publishing the research stressed its value for studying gravity and black holes.

Dolch was among a team of scientists called the North American Nanohertz Observatory for Gravitational Waves (NANOGrav) that searches for gravitational waves using pulsars (stars producing radio pulses). The scientists working on this project believe monitoring the pulses from several of these stars simultaneously may be one way to detect low-frequency gravitational waves—something similar to ripples—which are theoretically emitted by two black holes circling each other at close distance. An inaccurate understanding of Earth’s relation to the solar system’s barycenter can cause errors in the data captured by these pulsar observations.

“The precision of these results will be very helpful for our ongoing research into gravitational waves and supermassive black holes,” said Dolch. “Studying the barycenter of our solar system will enable us to study the mysterious history of these black holes merging with one another.”

Dolch also uses other tools for his research. With the help of Hillsdale College students, he recently installed a small telescope on the Michigan campus. The Low Frequency All-Sky Monitor, as it is called, is a device that helps scan for rare celestial events.

About Hillsdale College

Hillsdale College is an independent liberal arts college located in southern Michigan. Founded in 1844, the College has built a national reputation through its classical liberal arts core curriculum and its principled refusal to accept federal or state taxpayer subsidies, even indirectly in the form of student grants or loans. It also conducts an outreach effort promoting civil and religious liberty, including a free monthly speech digest, *Imprimis*, with a circulation of more than 5.4 million. For more information, visit hillsdale.edu.

About NANOGrav

NANOGrav is the North American Nanohertz Observatory for Gravitational Waves NSF Physics Frontiers Center. Members are drawn from across the United States and Canada and study the universe using gravitational waves. NANOGrav scientists make use of some of the world's best radio telescopes. For more information, visit <http://nanograv.org/>.

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