

Citizen scientists help track asteroid

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SOUTHERN ALBERTA

It's not every day that ordinary citizens can help scientists with their research, but the opportunity did arise recently and a few Albertans responded quickly and with enthusiasm.

In the wee hours of the morning April 6, three members of the Big Sky Astronomical Society were observing the sky hoping to see the light from a star momentarily blocked by a passing asteroid.

Observing this eclipse, or "occultation" as astronomers call it, has scientific importance because if enough people observe the event then astronomers can accurately measure the size and shape of the asteroid. It could even result in the discovery of a previously unknown asteroid companion – an asteroid moon.

James Durbano, along with Harry Gelden and his nine-year-old son Reese Gelden, set up a telescope in High River at 4:10 a.m. They had planned to observe the bright star Zeta Ophiuchi (ZAY-tuh OFF-ee-YOO-kye) continuously from 4:30 a.m. until 4:50 a.m. in the hope they would see the starlight blocked for a few seconds as asteroid 824 Anastasia passed in front of the star.

According to predictions made by the International Occultation Timing Association (IOTA) the three night watchmen were standing on the eastern edge of the probable shadow track of the asteroid, however, they did not observe this rare celestial event.

"Not observing the occultation was disappointing," said Durbano. "Failure to see the event does not mean that we failed because even a negative result, if reported, helps astronomers to refine their measurements and make more accurate predictions next time."

According to Durbano, who frequently works as a guest teacher in both math and science classrooms at Highwood High School, the predicted shadow track of 824 Anastasia was just that — a prediction. It was the best attempt at forecasting the path of the shadow based on the available data.

"That's how science is done," said Durbano. "You make observations, collect data, use that data to make predictions, make more observations, collect



Photo courtesy of Sky & Telescope
This is what scientists were watching for on April 6.

more data, and then you refine your predictions in an attempt to make them even more accurate than they were previously."

The map shows the predicted shadow track of 824 Anastasia as it moves on a south-to-north path across Alberta. It is important to note a significant amount of uncertainty is associated with the predicted path. The green line is the predicted central line, the blue lines are the eastern and western edges of the predicted path, the red lines are the edges of the "one-sigma" uncertainty zone and the gray lines are the wider edges of the "two-sigma" uncertainty zone. The probability of observing the occultation from a location within the red lines is about 68 per cent and the probability of observing the occultation

from a location within the gray lines is about 95 per cent.

The reports submitted to IOTA within the first 48 hours after the occultation show the actual shadow track of the asteroid was about 75 kilometres to the west of the predicted shadow track. This puts the actual path about one sigma (one standard deviation) from the predicted path, which is not too bad statistically speaking, but it was more than enough to result in a negative observation for Durbano and Gelden.

They were not alone in reporting a negative observation, as more than 50 negative reports from observers all across western North America have been received so far. In fact, only four positive reports have been received to date.

Anastasia, the asteroid that caused so many people to get little sleep on the night of April 5-6, was discovered in 1916 by Russian Astronomer Grigory Neujmin. It was the 824th asteroid to be catalogued and it orbits the Sun once every 4.674 years. This asteroid is located in the main asteroid belt and is approximately 40 kilometres in size.

Zeta Ophiuchi, the star that was eclipsed by 824 Anastasia, is the third brightest star in the constellation of Ophiuchus (OFF-ee-YOO-kus). The

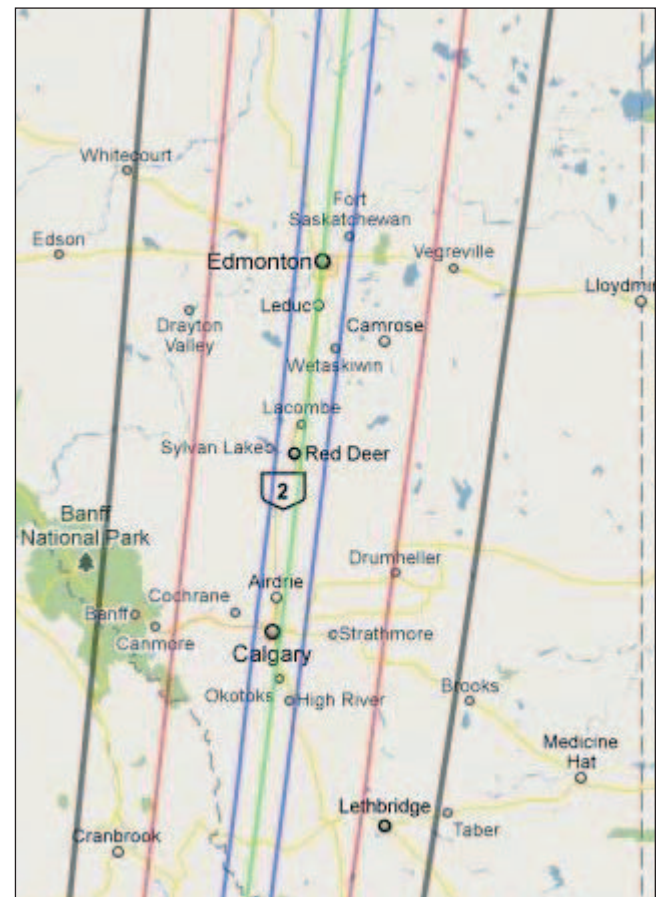


Photo courtesy International Occultation Timing Association (IOTA)
Here was the view of the predicted shadow track of 824 Anastasia as it moves on a south-to-north path across Alberta. The green line is the predicted central line, the blue lines are the eastern and western edges of the predicted path, the red lines are the edges of the "one-sigma" uncertainty zone and the gray lines are the wider edges of the "two-sigma" uncertainty zone.

apparent brightness of this star is more or less the same as the North Star (Polaris).

Zeta Ophiuchi is a hot blue giant star that is about six times hotter than the sun, 20 times more massive than the sun, and about 68,000 times more luminous than the sun. It is situated at a distance of about 500 light years from earth.

The Big Sky Astronomical Society owns and operates an observatory that is located adjacent to the Twin Valley Dam, which is approximately 50 kilometres southeast of High River. For further information, please phone 403-973-STAR.

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