



Key words: Interstellar Visitors, 1I/'Oumuamua, 2I/Borisov

<p>ESOcast Episode 224: First Interstellar Visitors to the Solar System</p>	
<p>00:00 [Visual starts] [Narrator] 1. By using ESO telescopes and other facilities, astronomers often glance into far-away planetary systems to gather clues about them.</p> <p>But, on rare occasions, scientists get to study these distant systems by looking much closer to home, when visitors from other corners of our galaxy drop by our Solar System.</p> <p>Meet the First Interstellar Visitors.</p>	<p>00:00</p>
<p>00:32 New ESOcast intro</p>	<p>00:00 New ESOcast introduction</p>
<p>00:44 [Narrator] 3. 1I/'Oumuamua and 2I/Borisov made headlines as they streaked through our Solar System. By determining their orbits, astronomers found that these objects came from stellar systems elsewhere in the Milky Way. Many wondered just what these mysterious space rocks were and where exactly they had come from...</p>	
<p>01:11 [Narrator] 4. The first of these interstellar visitors, 'Oumuamua, was discovered in October 2017 by astronomers in Hawaii when it was 33 million kilometres from Earth and already heading away from the Sun.</p>	

<p>01:27 [Narrator] 5. Observations with ESO's Very Large Telescope in Chile, and other observatories around the world, revealed 'Oumuamua's peculiar shape. Astronomers found it to be a dark, reddish, highly-elongated object, at least 400 metres long.</p>	
<p>01:44 [Narrator] 6. By tracing its path and speed, scientists determined that 'Oumuamua came from roughly the direction of Vega, in the Lyra constellation.</p> <p>This implies that this unique object has been traveling through space for at least half a million years – and probably longer.</p>	
<p>02:05 [Narrator] 7. Astronomers first suspected 'Oumuamua to be a comet, but they quickly realised it had failed to develop a coma as it approached the Sun, suggesting that it could be an interstellar asteroid instead.</p> <p>But looking in more detail, additional observations – including those with ESO's VLT – indicated that 'Oumuamua did have some cometary properties, making the exact nature of this peculiar visitor a mystery to this day.</p>	
<p>02:36 [Narrator] 8. 'Oumuamua truly is a strange messenger from afar. It is completely different from any other object astronomers have seen.</p>	
<p>02:47 [Narrator] 9. Two years after the first interstellar visitor flew through our Solar System, another interloper was discovered by amateur astronomer Gennady Borisov at his</p>	

<p>observatory in Crimea. After searching for asteroids and comets for over a decade, Borisov struck gold: in August 2019, he spied a foreign comet, speeding through our Solar System at 175,000 kilometres per hour.</p>	
<p>03:18 [Narrator] 10. After measuring its orbit, astronomers found that this new visitor, named 2I/Borisov, came from another star system, though not the same one as `Oumuamua. And contrary to the first interstellar visitor, 2I/Borisov looks much like a normal comet, with a cloud of gas and dust, and even a short tail.</p>	
<p>03:42 [Narrator] 11. Over the following months, astronomers aimed ESO's VLT and other telescopes at the object, searching for clues about what the alien visitor was made of. They found its chemical composition to be very similar to that of comets in our own Solar System. Astronomers hope to find some differences in the amounts of certain chemicals, providing them with the interstellar signatures of 2I/Borisov's parent system.</p>	
<p>04:14 [Narrator] 12. Using ALMA, astronomers discovered very large amounts of carbon monoxide coming out of the comet. This indicates it probably formed in a very cold environment.</p> <p>We don't know which star 2I/Borisov came from, but the observations of the object so far suggest that that star has been making comets in a way similar to the Sun.</p>	
<p>04:39 [Narrator] 13. Astronomers have learned a lot by studying these first interstellar visitors but still, a lot of questions remain.</p>	

<p>ESO's telescopes are ready to observe future visitors to the Solar System in great detail, enabling scientists to learn more about these mysterious space rocks.</p>	
<p>05:05 [Outro]</p>	<p><i>Produced by ESO, the European Southern Observatory.</i> <i>Reaching new heights in Astronomy.</i></p>