



<p><b>ESOCast Episode 58: ALMA Discovers a Comet Factory</b></p>	
<p>00:00 [Visuals start]</p> <p>[Narrator]</p> <p>1. Astronomers using the new Atacama Large Millimeter/submillimeter Array (ALMA) have imaged a region around a young star where dust particles can grow by clumping together.</p> <p>This is the first time that such a dust trap has been clearly observed. It solves a long-standing mystery about how dust particles in discs grow to larger sizes so that they can eventually form comets, planets and other rocky bodies.</p>	<p>Images:</p> <p>ALMA footage</p> <p>ALMA findings</p> <p>Dust trap animation</p>
<p><b>00:33</b> <b>ESOCast intro</b></p> <p>2. This is the ESOcast! Cutting-edge science and life behind the scenes at ESO, the European Southern Observatory.</p>	<p>ESOCast introduction</p>
<p><b>00:54</b> <b>[Narrator]</b></p> <p>3. Astronomers now know that there are plenty of planets around other stars. But many mysteries remain about how planets, comets and asteroids are formed.</p> <p>New observations from the powerful ALMA telescope are now helping to answer one of the biggest questions: how do the tiny grains of dust in the surroundings of a young star grow — first to become rubble, and then even boulders well over a metre in size?</p>	<p>Computer animations on exoplanets</p> <p>ALMA footage</p>
<p><b>01:26</b> <b>[Narrator]</b></p> <p>4. Computer models suggest that dust grains grow by colliding and sticking together. However, when the bigger grains collide again at high speed they are often smashed to pieces and sent back to square one.</p>	<p>Computer animation</p> <p>ALMA simulation from scientists</p>

<p>Even if they do not break up, the models show that the larger grains would be slowed down because of friction between the dust and gas, eventually falling onto the star without a chance to grow any further.</p> <p>Somehow, the tiny rocks need a safe haven where they can continue to grow until they are big enough to survive on their own. Such a dust trap had been proposed, but never observed, until now.</p>	<p>Computer animation</p>
<p><b>02:10</b> <b>[Narrator]</b> 5. Astronomers used ALMA to study a proto-planetary disc in a system called Oph-IRS 48. This system is circled by a ring of gas with a central hole that was probably created by an unseen planet or a companion star.</p> <p>Earlier observations using ESO's Very Large Telescope showed that the smaller dust particles also formed a ring. But the new ALMA view revealed that the larger dust particles were doing something quite different!</p>	<p>ALMA zoom -&gt; image</p> <p>Computer animation or ALMA footage (at start of sequence)</p>
<p><b>010</b> <b>[Narrator]</b> 6. Instead of the expected ring structure, a very clear cashew-nut shaped feature was revealed.</p> <p>This is a dust trap, a region where bigger dust grains are trapped and can grow much larger by colliding and sticking together.</p> <p>The observations also suggest that a kind of a comet factory has been found, because the particles in this dust trap can grow up to the size of comets, a few kilometres across.</p> <p>However, at this distance from the star, the dust is not likely to form full-sized planets.</p>	<p>ALMA image</p> <p>ALMA simulation from scientists</p> <p>Dust trap animation</p>
<p><b>03:22</b> <b>[Narrator]</b> 7. Soon, with ALMA's unprecedented sensitivity and image sharpness, it will be possible to observe dust traps much closer to their parent star. Such dust traps really would be the cradles where new planets are born.</p>	<p>ALMA footage</p> <p>Computer animation</p>
<p><b>03:43</b> <b>[Outro]</b></p>	<p>ALMA boilerplate and logos:</p> <p>The Atacama Large Millimeter/submillimeter Array (ALMA), an international astronomy facility, is a partnership of Europe, North America and East Asia in cooperation with the Republic of Chile.</p> <p>ESOCast is produced by ESO, the European Southern Observatory.</p> <p><i>ESO, the European Southern Observatory, is the pre-eminent intergovernmental science and technology organisation in astronomy designing,</i></p>

	<i>constructing and operating the world's most advanced ground-based telescopes.</i>
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