



Key words: ALMA, Big Bang, timemachine

<p>ESOCast 135: Why Astronomers Want to Use ALMA – ALMA is a timemachine!</p>	
<p>00:00 [Visuals start]</p>	<p>00:00 [Visuals start]</p>
<p>00:09 [Narrator] 1. How can astrophysicists study the story of the Universe? Billions of years ago, when the Big Bang happened, there was no Milky Way Galaxy, no Solar System, no planet Earth and, especially, no human beings to witness these and all the events that followed. So, how would they know about this stuff?</p>	
<p>00:25 [Narrator] 2. Well, it turns out that the Universe is, somehow, like a time machine. When looking at things in the sky, we are looking at their past. Yeah, it's a bit confusing but try it this way: When you hear a plane, you probably have a hard time spotting it in the sky. You look in the direction where the sound came from but the plane is no longer there.</p>	
<p>00:42 [Narrator] 3. That's because its sound took some time to reach you, and by the time it did, the plane had already moved on. In a way, you were "hearing back in time", as the sound you perceived was the one that left the plane seconds before.</p>	

<p>00:54 [Narrator] 4. With light it's exactly the same. Even though light is much faster than sound – in fact, it is the fastest thing we know - it still needs time to get from where it is emitted to where it is seen. The farther the object, the longer it takes for light to make the journey to the observer.</p>	
<p>01:09 [Narrator] 5. By looking at galaxies that are very far away from us, whose light takes billions and billions of years to reach us, we are seeing them how they looked like billions of years ago: when the Universe was much younger and they were just beginning to form.</p>	
<p>01:20 [Narrator] 6. But, as we look at galaxies that are closer and closer to us, studying them throughout time, it's possible to see how they age and change. Just like if we were looking at babies, children, teenagers and adults to see how humans develop.</p>	
<p>01:32 [Narrator] 7. The problem is when things are very far away from you, it gets to a point where it's impossible for your eyes to distinguish details. Telescopes, especially the ones that see the same kind of light as we do, also have a limit and are not able to detect the light emitted by the first galaxies ever formed, as they are too distant and their light is too faint.</p>	
<p>01:49 [Narrator] 8. In those galaxies, however, the first stars were born. And even though there's no telescope powerful enough to see them shine, ALMA, with its incredible sharpness and ability to see radio light, can distinguish</p>	

<p>the dust and gas clouds which formed by the first generations of stars in the Universe. This can help astronomers know a little bit more about these early phases of time and space, which are fundamental to understand our present.</p>	
<p>02:11 [Outro]</p>	<p><i>Produced by ESO, the European Southern Observatory. Reaching new heights in Astronomy.</i></p>

