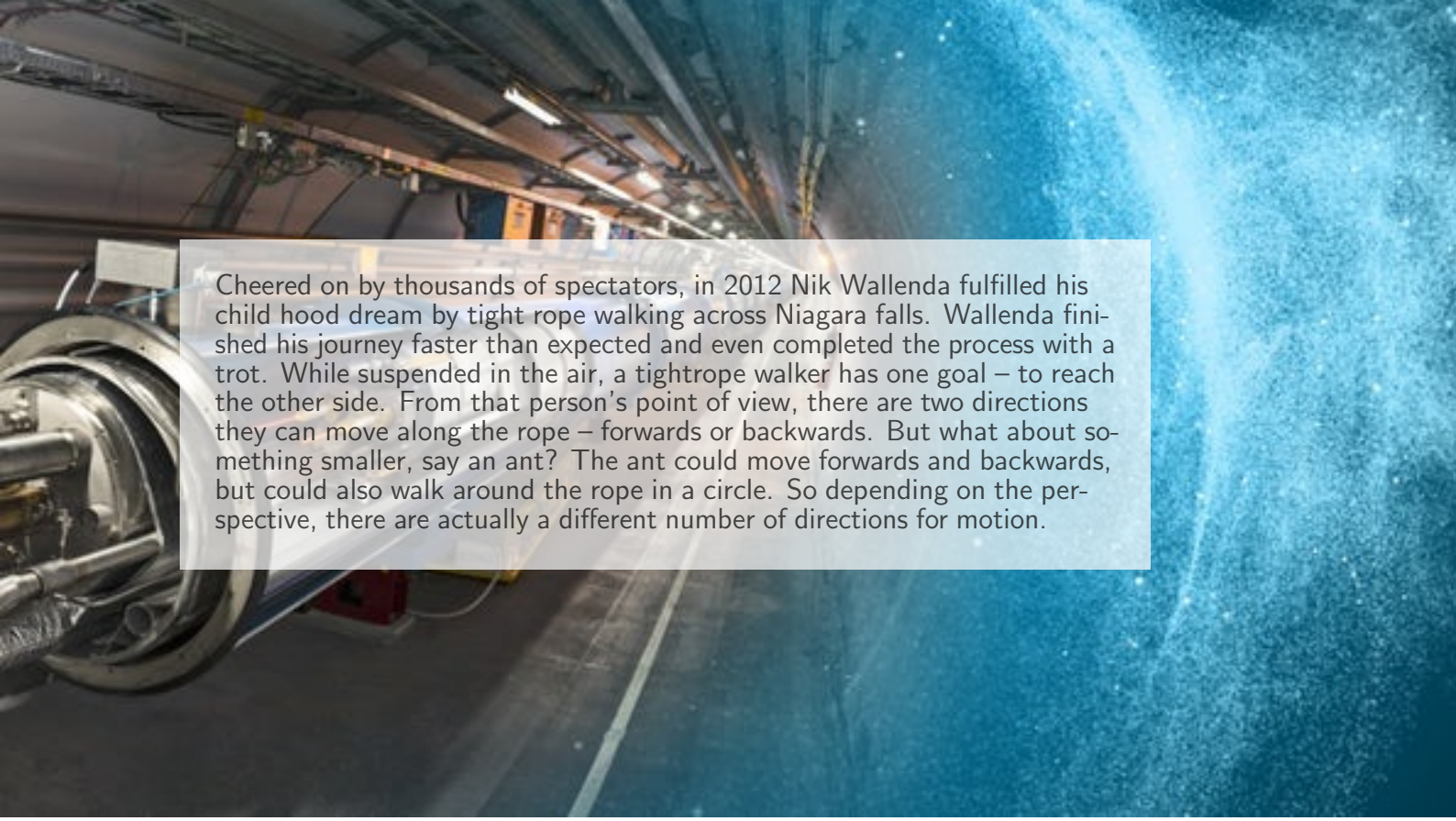

Cheered on by thousands of spectators, in 2012 Nik Wallenda fulfilled his child hood dream by tight rope walking across Niagara falls. Wallenda finished his journey faster than expected and even completed the process with a trot. While suspended in the air, a tightrope walker has one goal – to reach the other side. From that person's point of view, there are two directions they can move along the rope – forwards or backwards. But what about something smaller, say an ant? The ant could move forwards and backwards, but could also walk around the rope in a circle. So depending on the perspective, there are actually a different number of directions for motion.

Searching For Extra Dimensions In The Universe

Justin Williams

The example above is a great way to conceptualize one possible way that extra dimensions could exist in our universe. Scientist agree that we live in at least a four dimensional world. There are three spatial dimensions with the fourth dimension being time. However, there is a lot of evidence that points to the effects of more dimensions that exist around us every day. Without going in to too much detail, I'll share with you a few pieces of this evidence.

For one, there's this weird thing called Dark Matter which we know makes up about 80% of the known universe because of astrophysical measurements. On another note, the most successful theory in the history of physics, the Standard Model, does a remarkable job of explaining ALMOST everything in the universe. However, there are a few discrepancies that it can not explain. One of the biggest questions in physics is why does the universe exist at all? In theory, matter, and antimatter should exist in equal amounts, meaning that everything should cancel out and nothing should exist. Also weird, right?

Well what would you say if I told you that the existence of extra dimensions could explain all of these anomalies? That is why thousands of physicist around the world are so excited to conduct research at the largest experiment ever built – the Large Hadron Collider (LHC). By colliding particles at 99.999999% the speed of light, we're able to search for indirect effects of such extra dimensions.

To be more specific, I study the particles that carry light, which are called photons. You can think of them as a grain of sand on the beach. We typically see so many photons at the same time that it's like seeing all the sand on the beach. But by studying the way these individual particles interact, we can learn a lot about the way the universe is put together. For example, if we observe anomalous interactions between photons, then we can infer that there is some new form of physics at work. Better yet, based on the theories that predict abnormal behaviors in photons, we can almost certainly point to extra dimensions as the culprit of the physics that is alluding us.

I can only imagine what it's like to walk across a tight rope while suspended thousands of feet in the air. But in the same way that Nik Wallenda seeks excitement from adventurous stunts, physicist at the LHC are excited to discover a signature of new physics that would enhance our understanding of the world around us.