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Imagining hidden worlds

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When four English school children walked through a wardrobe into a strange new world on the big screen this past month, it renewed the 50-year-old debate about how closely Narnia's lion king resembles Christ, and how closely C.S. Lewis' story resembles a Christian allegory.

But his story is much more than that. It has captured the imaginations of generations of children precisely because, like his fellow Oxford colleague J.R.R. Tolkien's masterpiece "The Lord of the Rings," it tapped into a longstanding human yearning for a hidden universe where the rules may be different, life may be better and new evidence for meaning and purpose may exist.

What child hasn't imagined that the closet or the basement might not open up to a secret universe? I vividly remember - perhaps as Lewis Carroll did - putting my face up closely to a mirror to try and look around the corner to see if the world in the mirror might somehow differ from my own.

The mechanism chosen by Lewis for his portal to Narnia is, in the context of much of the current activity in physics, remarkably prescient. The children in his story open the door to an old wardrobe and find that behind the clothes rack is a new world. Yet, if one were to go behind the piece of furniture, nothing strange would be observed. From the perspective of modern mathematics, there is one way for such a thing to occur: If the back of the wardrobe connected to an extra dimension of space, an entire universe could exist without occupying any volume in our observable world.

This idea is precisely what some particle theorists have recently proposed as they attempt to understand the strange nature of gravity, which, as Einstein recognized 90 years ago, appears to be a manifestation of a possible curvature of space in response to matter and energy.

What makes this particularly strange is that the other known forces in nature do not have such an interpretation. Just four years after the development of the theory of general relativity, mathematician Theodor Kaluza suggested that the only other force known at the time, electromagnetism, might also be due to a curvature - not in the three dimensions of space we know, but rather in a hypothetical fourth spatial dimension. Seven years later, the theorist physicist Oskar Klein proposed that the hidden dimension might be curled up in a very small circle, undetectable by any probe that had yet been invented.

In the intervening 80 years, Kaluza and Klein's idea has been resuscitated in a variety of contexts and helped form the modern basis for the extra dimensions required in string theory, proposed in the 1980s as a way to try and understand the mysterious nature of gravity at small scales.

But extra, curled-up dimensions are not nearly as fascinating as extra dimensions that might be large enough to hide universes like our own. And physics has responded to this fascination with the remarkable realization, less than a decade ago, that it is possible for even infinitely large extra dimensions to exist in nature and still have remained hidden from all of our experimental probes.

The key question, because this is supposed to be physics and not metaphysics, is whether there is any way to directly detect such extra dimensions, and theorists have been working hard to explore ways that the next large particle accelerator being built in Geneva might provide some evidence.

Not a shred of empirical data suggests that the ideas being explored by string theorists, whether or not large extra dimensions exist, actually reflects the underlying nature of our world.

Still, that is the beauty of science, art and literature - indeed of all the products of our human imagination. It is quite possible that if we could not imagine hypothetical hidden worlds, then the world of our experience might become intolerable. But if we are bold enough to subject some of our ideas to empirical tests, recognizing that they are likely to be proved wrong, as were my youthful imaginings about the mirror, we might just end up every now and then opening the door to a magical wardrobe of our own.

Krauss, a professor of physics and astronomy at Case Western Reserve University, is the author of several books, including the recently published "Hiding in the Mirror: The Mysterious Allure of Extra Dimensions from Plato to String Theory and Beyond."