What if there is only one universe?

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(PhysOrg.com) -- Lee Smolin, author of the bestselling science book The Trouble with Physics and a founding member and research physicist at the Perimeter Institute for Theoretical Physics in Waterloo, Canada, writes exclusively in the June issue of *Physics World* explaining why theories of cosmology that suggest that our universe is just one of many - the so-called multiverse - and thus perpetuate the notion that time does not exist are flawed.

Smolin explains how theories describing a myriad of possible universes, with less or more dimensions and different kinds of particles and forces, have become increasingly popular in the last few years. However, through his work with the Brazilian philosopher Roberto Mangabeira Unger, Smolin believes that, despite there being good reasons for the conclusion that we live in a timeless multiverse, those theories, and the concomitant assumption that time is not a fundamental concept, are

"profoundly mistaken".

Smolin points out why a timeless multiverse means that our laws of physics are no longer determinable from experiment and how the connection between fundamental laws, which are unique and applicable universally from first principles, and effective laws, which hold based on what we can actually observe, becomes unclear.

Smolin suggests a new set of principles that he hopes will begin a fresh adventure in science where we have to reconceive the notion of law to apply to a single universe that happens just once. These principles begin with the assertion that there is only one universe; that all that is real is real in a moment, as part of a succession of moments; and that everything that is real in a moment is a process of change leading to the next or future moments. As he explains, "If there is just one universe, there is no reason for a separation into laws and initial conditions, as we want a law to explain just one history of the one universe."

If we embrace the idea that there is only one universe and that time is a fundamental property of nature, then this opens up the possibility that the laws of physics evolve with time. As Smolin writes, "The notion of transcending our time-bound experiences in order to discover truths that hold timelessly is an unrealizable fantasy. When science succeeds, we do nothing of the sort; what we physicists really do is discover laws that hold in the universe we experience within time. This, I would claim, should be enough; anything beyond that is more a religious urge for transcendence than science."

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