Fed “string theory,” computer reportedly explains our 3D space

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Courtesy of
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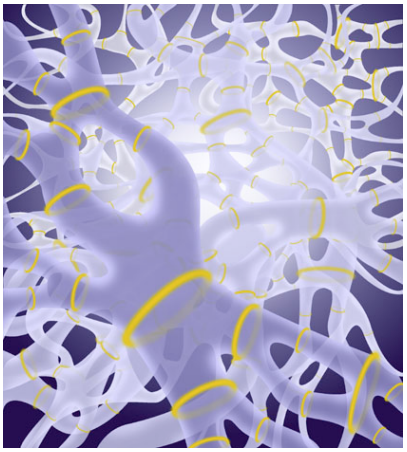
A long-controversial but popular theory of the universe has enabled a supercomputer to explain why space appears three-dimensional, some physicists say.

The human brain can’t really conceive of a space with more than three dimensions, often called height, width and length. But scientists say there is no mathematical reason there can’t be more such directions. Indeed, a theory of the universe called superstring theory insists there are. What outweighs this inconvenience, in the minds of its many proponents, is that this model manages to offer a unified explanation for nature’s otherwise disparate building blocks and physical forces.



Superstring theory visualizes the elementary particles of nature as tiny loops that vibrate like strings. When they move through time, they trace out structures known as worldsheets. The artist's conception above is designed to help illustrate the overall idea. (Image courtesy Flavio Robles/L Berkeley Nat'l Lab)

Superstring theory—which is actually one version of a group of theories collectively called string theory—asserts that nature’s component particles can all be represented as the different ways that tiny strings can vibrate in these many dimensions. These vibrational possibilities are analogous to the possible notes of a guitar or violin string.

A frequent objection to string theory is that it’s untestable, a criticism its proponents often

dispute, though it has not passed any real-world tests with wide agreement.

One thing most physicists do agree on is that the universe originated in an explosion from an invisibly tiny point. Various observations, including that the universe is still expanding in a continuation of this primal burst, support this idea. However, scientists haven't been able to clarify how this "Big Bang" happened in detail.

In superstring theory, one of the allowed string vibrations corresponds to a particle that carries the force of gravity. Superstring advocates say this feature leads to another advantage: it brings elementary particles as a group under the reach of Einstein's general theory of relativity—an extremely powerful model of the universe, but one that chiefly describes gravity and has difficulty illuminating the world of subatomic particles. By extending its reach into that realm, researchers believe they can also probe more deeply into the nature of the Big Bang.

A remaining stumbling block has been that calculations have been unable to account for complications resulting from interactions among strings themselves.

In the new study, physicists with the High Energy Accelerator Research Organization, Shizuoka University and Osaka University, all in Japan, said they developed a mathematical method to overcome this last problem. With that, they managed to simulate the birth of the universe as though it had started with nine spatial dimensions, as claimed by superstring theory.

As the simulation went on, three of these dimensions turned out to undergo an expansion that would allow them to become visible today, consistent with reality, the scientists reported. The rest of the dimensions remained hidden. String theorists hold that unseen extra spatial dimensions are curled up so that they become relevant only at minuscule scales.

The new findings support superstring theory, and are to be published in the journal *Physical Review Letters*, said the investigators, who performed work on the supercomputer Hitachi SR16000 at Kyoto University. The research might also be extended to help explain additional mysteries, such as why the universe is expanding at an ever-growing rate, they added.