Physicists Claim Universe 'Rings' Like Crystal Glass

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Not unlike the fading tones of a ringing crystal goblet, the spacetime continuum and the universe itself may be oscillating through billions of years of cosmic time, say two U.S. physicists.

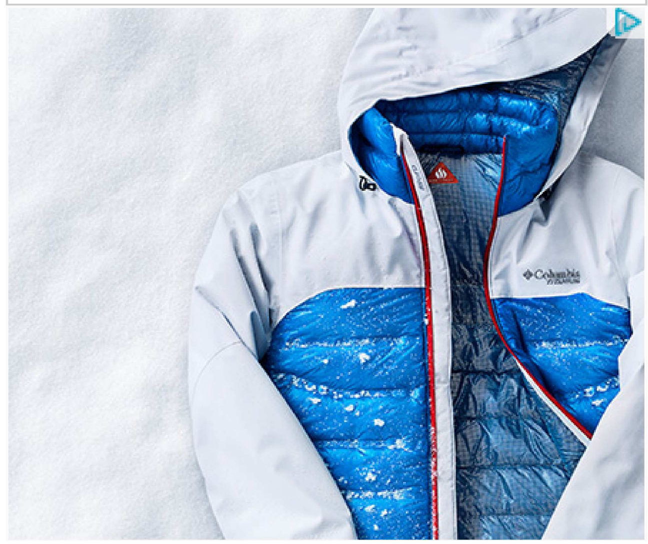
In a paper recently published in *The Astronomical Journal*, physicists

Harry Ringermacher and Lawrence Mead at the University of Southern Mississippi (USM) in Hattiesburg, detail analysis of some 400 Type 1a supernova data points against cosmic look-back time. They conclude that the speed of the expansion of the universe has varied at least seven times during its 13.8 billion year history.

“We found that the universe has been wiggling during its expansion and that 7 such “cycles” or oscillations have occurred since the beginning of time,” Ringermacher, a USM adjunct professor of physics and the paper’s lead author, told me. “Each wiggle or cycle consists of a slow-down, followed by a speed-up, followed by a slow-down.”

Ringermacher says that they also observed secondary “harmonics” of those wiggles at 14 and 21 cycles, akin to such secondary harmonics produced by musical instruments. If one thinks of the 3-dimensional expanding volume of the universe as a 2-dimensional glass, he explains, then a tap on the glass will cause it to ring or oscillate.

We postulated the existence of a “scalar field,” a non-directional variable force in spacetime, he says, that is essentially the same as the one responsible for inflation, but which penetrates into the present epoch. Ringermacher notes that this scalar



field is possibly the cause of the oscillations.

“So, this new model replaces the traditional dark matter term in Einstein’s equations with an oscillating term,” said Ringermacher. “In reality, the “wave” has properties of both dark matter and dark energy.”

A montage of five different objects — ranging from a distant galaxy to a relatively close supernova remnant. Type 1a Supernovae are used to track the expansion of the universe. Credit: X-ray: NASA/CXC/MIT/D.Castro et al, Optical: NOAO/AURA/NSF/CTIO.

With the discovery of dark energy in 1998, astronomers recognized that the universe had actually transitioned from a decelerating cosmos to an accelerating cosmos at least once — when the universe was roughly half its current age.

But the key to the new research lies in a novel way of plotting Type 1a supernova data, using what the authors describe in their paper as a "model-independent plot" of the radius of the universe against cosmic look-back time. The extremely bright Type 1a supernovae are widely regarded as astrophysical "standard candles" for measuring the universe's expansion.

"By discovering a reliable new way to plot the distances of supernova events against time we were able to see features in the data that heretofore were obscured," said Ringermacher. He notes that the oscillations they observed across the metric of time would not be as obvious in terms of redshift.

Publicly available data, largely culled from the 2011 Supernova Legacy Survey (SNLS-3), enabled Ringermacher and Mead to come up with their results. "We analyzed the data 4 independent ways and found the 7 cycle signal in all methods along with 2 multiples of this frequency at 14 and 21 cycles," said Ringermacher.

At what time intervals would these

oscillations have occurred?

They appeared in the data between 8.3 billion years ago and 1.4 billion years ago, says Ringermacher, and appear to continue even to the present but are very small.

“The very earliest [such] oscillations, according to our new model, occurred approximately 500 million years after the big bang and indicated a significant deceleration of the universe,” said Ringermacher. “This first slow-down was significantly greater than that predicted by the standard model of big bang cosmology.”

Ringermacher says this deceleration at early times may explain why observations of the early universe show more galactic structure than predicted. The deceleration could have allowed matter to coalesce into stars and proto-galaxies.

In their paper, the authors note that the best confirmation would be with new information contained in a new Type 1a supernova data set hopefully coming out soon.

If confirmed, what do these oscillations tell us about the big bang or the makeup of the universe itself?

“A more remote possibility is that this “wave” is the result of a collision between our universe and another; implying that dark matter and dark energy are related to events in higher dimensions," said Ringermacher.

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