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'Big Wave' Theory Offers Alternative to Dark Energy

[Space.com](#) ^ | 8/18/09 | Clara Moskowitz

Posted on **August 19, 2009 11:03:17 AM PDT** by [LibWhacker](#)

Mathematicians have proposed an alternative explanation for the accelerating expansion of the universe that does not rely on the mystifying idea of dark energy.

According to the new proposition, the universe is not accelerating, as observations suggest. Instead, an expanding wave flowing through space-time has caused distant galaxies to appear to be accelerating away from us. This big wave, initiated after the Big Bang that is thought to have sparked the universe, could explain why objects today appear to be farther away from us than they should be according to the Standard Model of cosmology.

"We're saying that maybe the resulting expanding wave is actually causing the anomalous acceleration," said Blake Temple of the University of California, Davis. "We're saying

that dark energy may not really be the correct explanation."

The researchers derived a set of equations describing expanding waves that fit Einstein's theory of general relativity, and which could also account for the apparent acceleration. Temple outlines the new idea with Joel Smoller of the University of Michigan in the Aug. 17 issue of the journal *Proceedings of the National Academy of Sciences*.

While more research will be needed to see if the idea holds up, "the research could change the way astronomers view the composition of our universe," according to a summary from the journal.

To convince other cosmologists, the new model will have to pass muster with further inquiry.

"There are many observational tests of the standard cosmological model that the proposed model must pass, aside from the late phase of accelerated expansion," said Avi Loeb, director of the Institute for Theory and Computation at the Harvard-Smithsonian Center for Astrophysics. "These include big bang nucleosynthesis, the quantitative details of the microwave background anisotropies, the Lyman-alpha forest, and galaxy surveys. The authors do not discuss how their model compares to these tests, and whether the number of free parameters they require in order to fit these observational

constraints is smaller than in the standard model. Until they do so, it is not clear why this alternative model should be regarded as advantageous."

Johns Hopkins University astrophysicist Mario Livio agreed that to be seriously considered, the model must be able to predict properties of the universe that astronomers can measure.

He said the real test "is in whether they are able to reproduce all the observed cosmological parameters (as determined, e.g. by a combination of the Hubble Constant and the parameters determined by the CMB observations). To only produce an apparent acceleration is in itself interesting, but not particularly meaningful."

Inconvenient truths

Dark energy is itself a hasty fix to an inconvenient truth discovered by astronomers in the late 1990s: that the universe is expanding, and the rate of this expansion seems to be constantly picking up speed.

To explain this startling finding, cosmologists invoked dark energy, a hypothetical form of energy that is pulling the universe apart in all directions (note that dark energy is wholly separate from the equally mysterious concept of dark

matter - a hypothetical form of matter that populates the universe, interacting gravitationally with normal matter, but which cannot be seen with light). In this interpretation, the whole universe is blowing up like a balloon, and from any given point within it, all distant objects appear to be speeding away from you.

But not everyone is happy with the dark energy explanation.

"It just seems like an unnatural correction to the equations - it's like a fudge factor," Temple told SPACE.com. "The equations don't make quite as much physical sense when you put it in. You just put it in to fit the data."

Temple and Smoller think the idea of an expanding wave makes more sense.

"At this stage we think this a very plausible theory," Temple said. "We're saying there isn't any acceleration. The galaxies are displaced from where they're supposed to be because we're in the aftermath of a wave that put those galaxies in a slightly different position."

Ripples in a pond

Temple compared the wave to what happens when you throw a rock into a pond. In this case, the rock would be the Big

Bang, and the concentric ripples that result are like a series of waves throughout the universe. Later on, when the first galaxies start to form, they are forming inside space-time that has already been displaced from where it would have been without the wave. So when we observe these galaxies with telescopes, they don't appear to be where we would expect if there had never been a big wave.

One potential issue with this idea is that it might require a big coincidence.

For the universe to appear to be accelerating at the same rate in all directions, we in the Milky Way would have to be near a local center, at the spot where an expansion wave was initiated early in the Big Bang when the universe was filled with radiation.

Temple concedes that this is a coincidence, but said it's possible that we are merely in the center of a smaller wave that affects the galaxies we can see from our vantage point - we need not be in the center of the entire universe for the idea to work.

TOPICS: [Astronomy](#); [Science](#)

KEYWORDS: [big](#); [catastrophism](#); [dark](#); [energy](#); [stringtheory](#); [wave](#); [xplanets](#)

1 posted on **August 19, 2009 11:03:18 AM PDT** by **LibWhacker**
[[Post Reply](#) | [Private Reply](#) | [View Replies](#)]

To: **LibWhacker**

Of course, this has been mine personal position for years. It's finally nice to see the scientific community getting on board.
[mattdono darts eyes left and right]

2 posted on **August 19, 2009 11:06:03 AM PDT** by **mattdono** (The platform I want: Stop spending my money. Stop sending my money. Stop taking my money.)
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To: **mattdono**

mine = my
(I guess a joke is better when you **actually** TYPE CORRECTLY!)

3 posted on **August 19, 2009 11:06:46 AM PDT** by **mattdono** (The platform I want: Stop spending my money. Stop sending my money. Stop taking my money.)
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To: **LibWhacker**

Actually this is an intriguing idea - anything that gets rid of Dark Matter or Dark Energy in our model of the universe is a plus. So I kind of like it.

4 posted on **August 19, 2009 11:10:12 AM PDT** by **InterceptPoint**
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To: **LibWhacker**

One potential issue with this idea is that it might require a big coincidence.

One man's coincidence is another's plan.

5 posted on **August 19, 2009 11:10:23 AM PDT** by **trad_anglican**
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To: **mattdono**

I'm going with 'wave of dark energy' as a union of the two theories.

The more you know, the more you realize how little you know.

6 posted on **August 19, 2009 11:16:10 AM PDT** by **existtoexcel**
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To: **LibWhacker**

Atheists and Darwinians build their views on faith, not scientifically verifiable evidence. Dark energy and dark matter are leaps of faith, for there is no scientific evidence that these actually exist. Now we are to believe that what we thought that we were seeing and measuring were not real, but only illusions. There goes the whole theory of verificationism. It turns out that empiricalism is an illusion. Maybe Hume was right in that cause and effect are illusions, too. If so, then science is a religion based upon unverifiable faith.

7 posted on **August 19, 2009 11:17:40 AM PDT** by **Nosterrex**
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To: **LibWhacker**

The paper for those so inclined :

[A one parameter family of expanding wave solutions of the Einstein equations that induces an anomalous acceleration into the Standard Model of Cosmology](#)

(I do not understand a single word, but I know from previous articles that there are many in these parts who do.)

8 posted on **August 19, 2009 11:19:36 AM PDT** by **Dahoser** (The missus and I joined the NRA. Who says Obama can't inspire conservatives?)

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To: **mattdono; LibWhacker**

So dude,

The Milky Way is our surf board, and we're just catching a wave?

Cool.

9 posted on **August 19, 2009 11:20:17 AM PDT** by **DannyTN**
[[Post Reply](#) | [Private Reply](#) | [To 2](#) | [View Replies](#)]

To: **LibWhacker**

Gnarly, dude!

10 posted on **August 19, 2009 11:20:36 AM PDT** by **mikrofon** (Catch

the Wave)

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To: **LibWhacker**

So now it's goodbye to "dark energy." Do we have to say goodbye to "dark matter" too? Or does that stay?

Question for cosmologists. The expanding wave is a wave of WHAT?

Don't say "spacetime" because space is what you have when you remove all matter, and time is assigning numbers to the motion of bodies, so "spacetime" does not refer to any reality.

I never did like the big bang + expanding universe + dark matter story. I like this one better, but in 50 years they will find that it too is not the answer.

11 posted on **August 19, 2009 11:23:39 AM PDT** by **Leftism is Mentally Deranged**

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To: **DannyTN**

Woww. Far out, man!

12 posted on **August 19, 2009 11:25:13 AM PDT** by **mattdono** (The platform I want: Stop spending my money. Stop sending my money. Stop taking my money.)

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To: **InterceptPoint; mattdono**

Ditto! I never bought into the imaginary dark matter an energy. That this new theory fits Einstein's equations gives it a solid foundation.

13 posted on **August 19, 2009 11:27:59 AM PDT** by **BubbaBasher** ("Liberty will not long survive the total extinction of morals" - Sam Adams)

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To: **Nosterrex**

Atheists and Darwinians build their views on faith, not scientifically verifiable evidence. Dark energy and dark matter are leaps of faith, for there is no scientific evidence that these actually exist. Now we are to believe that what we thought that we were seeing and measuring were not real, but only illusions. There goes the whole theory of verificationism. It turns out that empiricism is an illusion. Maybe Hume was

right in that cause and effect are illusions, too. If so, then science is a religion based upon unverifiable faith.

Yes Dark Energy and Dark Matter are, at this point, leaps of faith. But the search continues and may bare fruit. Who knows. But it is the reason that I don't like DM an DE. But that would change if someone can put meat on the bones.

OTOH, the wave theory in no way destroys the scientific method. It makes predictions that are verifiable and it can be proven wrong by experiment. That satisfies the basic elements of a scientific theory. In fact it makes it superior to string "theory" which can do neither. Empiricism is not an illusion and this theory isn't going to make it so. Nice try but you are just dead wrong on this one.

14 posted on **August 19, 2009 11:31:02 AM PDT** by **InterceptPoint**
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To: **LibWhacker**

So Dark Energy goes the way of aether?

15 posted on **August 19, 2009 11:31:26 AM PDT** by **Yo-Yo**
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To: Leftism is Mentally Deranged

"So now it's goodbye to "dark energy." Do we have to say goodbye to "dark matter" too? Or does that stay?"

I'd be happy if I could just say goodbye to Dark President. But not because of his color.

16 posted on **August 19, 2009 11:31:57 AM PDT** by **DannyTN**
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To: Leftism is Mentally Deranged

It is definitely time to do away with all that dark matter. My wife complains incessantly about it getting all over the carpet ever since it was theorized.

17 posted on **August 19, 2009 11:34:41 AM PDT** by **arthurus** ("If you don't believe in shooting abortionists, don't shoot an abortionist." -Ann C.)
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To: InterceptPoint

I don't believe that I am wrong. The entire article deals with the basis of such theories concerning the expanding universe on hypotheses that have not proven to be true. Dark matter

and dark energy are hypotheses that are driven by what astrophysicists have observed, namely, that the universe is not behaving as it should from their presuppositions or assumptions. It is similar to Einstein's coefficient which he "created" to make his equation fit. It doesn't add up, so we have to "create" something that makes our assumptions fit. The wave theory is well known, and it is a very useful model, but mathematics is a creation that is not bound to reality. You can prove things in mathematics that can't exist in the real world. The wave theory may turn out to explain what appears to be irrational behavior, but that at least to this date has not been proven. It is a matter of faith, an hypothesis, which is based upon the faith that current scientific presuppositions or ideologies are true.

18 posted on **August 19, 2009 12:21:49 PM PDT** by **Nosterrex**
[[Post Reply](#) | [Private Reply](#) | [To 14](#) | [View Replies](#)]

To: **LibWhacker**

Soooooo does this mean you can only see the wave from the SHALLOW end of the pool?

19 posted on **August 19, 2009 12:31:45 PM PDT** by **Oldpuppymax**
(AGENDA OF THE LEFT EXPOSED)
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To: **Nosterrex**

It is a matter of faith, an hypothesis, which is based upon the faith that current scientific presuppositions or ideologies are true.

You are just simply begging the question. There are really no "scientific truths". Science makes it's best guess, continues to look for holes in the basic assumptions and then proceeds to build fantastic gadgets based on the "unproven" or "unprovable" current theory. That's just the way science works. Ask Newton what he would think about Einstein's theories of gravity and motion. He would be surprised but not astonished.

20 posted on **August 19, 2009 1:26:15 PM PDT** by **InterceptPoint**
[[Post Reply](#) | [Private Reply](#) | [To 18](#) | [View Replies](#)]

To: **InterceptPoint**

“There are really no “scientific truths”.” Is that true?

21 posted on **August 19, 2009 1:31:59 PM PDT** by **Nosterrex**
[[Post Reply](#) | [Private Reply](#) | [To 20](#) | [View Replies](#)]

To: **Nosterrex**

“There are really no “scientific truths”.” Is that true?

In absolute sense: NO. In the practical sense: YES. We design machines that can go to Mars and send back images with the science we have. But will the "Theory of Gravity" predict correctly the results of every experiment that it applies to? Who knows? We will never run every experiment so there is always going to be room to doubt any theory.

OTOH, have you seen any rocks falling up lately? Me neither so Newton had a pretty good theory despite the fact that it wasn't "true".

22 posted on **August 19, 2009 1:39:13 PM PDT** by **InterceptPoint**
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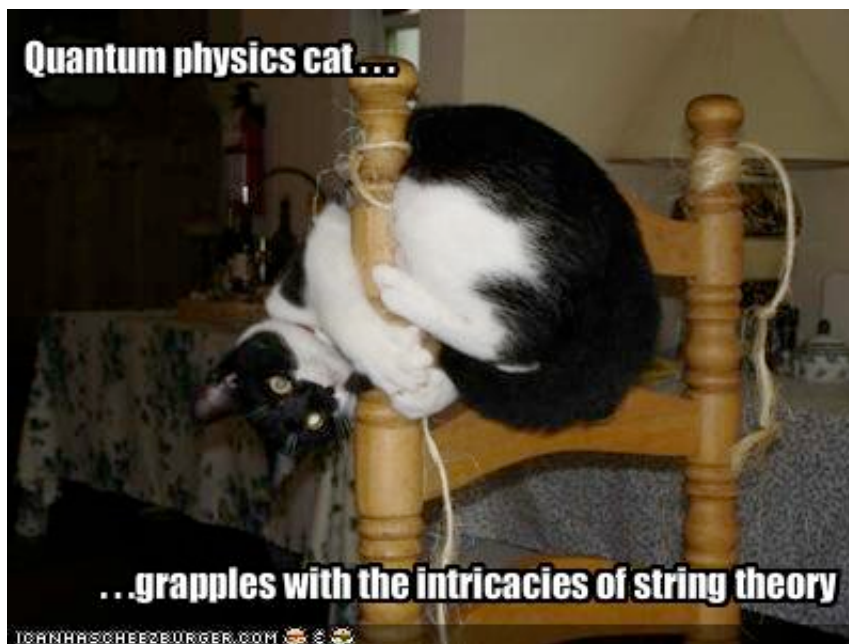
To: **InterceptPoint**

Actually I think I got that backwards but you get the idea.

23 posted on **August 19, 2009 2:46:38 PM PDT** by **InterceptPoint**
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To: **AdmSmith; bvw; callisto; ckilmer; dandelion; ganeshpuri89; gobucks; KevinDavis; Las Vegas Dave; ...**

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To: **LibWhacker**

Well, this makes more sense than the fudge factor of dark

energy (and dark matter). However, I still hold that the truth is that G is NOT a perfect reciprocal with respect to distance, and instead has an inverse linear component.

27 posted on **August 19, 2009 4:36:55 PM PDT** by **AFPhys** ((.Praying for President Bush, our troops, their families, and all my American neighbors..))

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To: **LibWhacker**

"It just seems like an unnatural correction to the equations - it's like a fudge factor," Temple told SPACE.com. "The equations don't make quite as much physical sense when you put it in. You just put it in to fit the data."

Mr Temple says this about dark matter. It also describes his theory though. What is the mechanism here? It sounds as though the authors are suggesting antigravity or merely regurgitating Einstein's Cosmological Constant and giving it a positive value. Nothing new there.

28 posted on **August 19, 2009 5:08:11 PM PDT** by **allmost**
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To: **LibWhacker**

This big wave, initiated after the Big Bang that is thought to have sparked the universe, could explain why objects today appear to be farther away from us than they should be according to the Standard Model of cosmology.

I dub this the "Big Fart".

29 posted on **August 19, 2009 6:35:35 PM PDT** by **AndrewC**
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To: **SunkenCiv**

String theory is the basic answer to the question of whether anything actually stupider than evolution exists...

30 posted on **August 19, 2009 7:34:48 PM PDT** by **wendy1946**
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