

Testing Milgromian String Theory

ABSTRACT: What are the tests of string theory? What is Milgromian string theory, and how might Milgromian string theory be tested? If the string theorists are correct about string theory and if Milgrom's acceleration law is empirically valid when gravitational accelerations are low, then what might be the meaning of "Milgromian string theory"? What might be the physical basis of MOND? Consider 3 ideas: (1) Fernández-Rañada and Tiemblo-Ramos suggested that atomic time might be different from astronomical time. (2) Dark matter has zero inertial mass-energy and positive gravitational mass-energy. (3) Dark energy has zero inertial mass-energy and negative gravitational mass-energy. My guess is that the preceding ideas combined with Milgrom's acceleration law (MOND) plausibly imply the Fernández-Rañada-Milgrom effect. Replace the $-1/2$ in the standard form of Einstein's gravitational field equations by $-1/2 + \text{dark-matter-compensation-constant}$, where this constant is approximately $\sqrt{((60 \pm 10)/4)} * 10^{-5}$. Designate this constant by $\langle D-M-C-C \rangle$. In the "Meaning of Relativity" 5th edition page 87, the formula (101) should have $-\kappa/(2\pi)$ replaced by $(-\kappa/(4\pi)) * (1/2 - \langle D-M-C-C \rangle)^{-1}$ on the hypothesis of the Fernández-Rañada-Milgrom effect.

MILGROMIAN STRING THEORY

Is Milgrom wrong?

"... I came to the subject a True Believer in dark matter, but it was MOND that nailed the predictions for the LSB galaxies that I was studying (McGaugh & de Blok, 1998), not any flavor of dark matter. So what I am supposed to conclude? ..." — S. McGaugh

http://en.wikiquote.org/wiki/Stacy_McGaugh

According to Pavel Kroupa, empirical evidence rules out the Lambda Cold Dark Matter Cosmological Concordance Model. Kroupa also claims that if dark matter particles exist then they cannot have enough mass-energy to explain the empirical facts of cosmology.

http://en.wikipedia.org/wiki/Pavel_Kroupa

For the sake of argument let us assume that the two preceding claims by Kroupa are correct. Many theoretical physicists (and perhaps the vast majority of string theorists) believe that string theory is the only mathematically plausible way of unifying quantum field theory and general relativity.

My guess is that Bekenstein's TeVeS is fundamentally wrong because it lacks a plausible basis in string theory.

http://en.wikipedia.org/wiki/Tensor-vector-scalar_gravity

I have suggested a version of string theory with the finite nature hypothesis. If my Space Roar Profile Prediction is empirically invalid, then my guess would be that the finite nature hypothesis is either empirically invalid or empirically useless. However, I claim that an easy scaling argument proves that the Fernández-Rañada-Milgrom effect is approximately equivalent to Milgrom's acceleration law when gravitational accelerations are low.

Whatever “Milgromian string theory” might be, it needs to be developed on the basis of empirical failures of Newton-Einstein gravitational theory. Milgromian string theory might be defined as any version of string theory that is approximately compatible with Milgrom’s acceleration law.

"String theory is the only known generalization of relativistic quantum field theory that makes sense." — Edward Witten

<http://www.sns.ias.edu/~witten/papers/Unravelling.pdf> "Unravelling string theory", Dec. 2005

According to Witten, string theory predicts gravity, nonabelian gauge symmetry, and supersymmetry.

<http://www.sns.ias.edu/~witten/papers/mmm.pdf> Magic, Mystery, and Matrix, 1998

One might say: Newton-Einstein string theory predicts Newton-Einstein gravity and superpartners, but Milgrom string theory predicts Milgrom gravity and no superpartners.

It is very unclear what Milgrom string theory is. One way of approaching Milgromian string theory is to replace the $-1/2$ in the standard form of Einstein’s field equations by $-1/2 +$ discrepancy-function. Careful empirical analysis of the discrepancy-function might lead to a correct stringy formulation of Milgrom’s MOND.

http://en.wikipedia.org/wiki/Modified_Newtonian_dynamics

I conjecture that the largest part of developing Milgromian string theory is precise testing of Newtonian/Einsteinian gravitational theory.

http://en.wikipedia.org/wiki/Modified_Newtonian_dynamics#Proposals_for_Testing_MOND

http://en.wikipedia.org/wiki/Tests_of_general_relativity

Perhaps the biggest problem with testing the gravitational redshift is caused by mascons.

[http://en.wikipedia.org/wiki/Mass_concentration_\(astronomy\)](http://en.wikipedia.org/wiki/Mass_concentration_(astronomy))

Huge amounts of data might overcome part of the mascon problem. Measure the redshift at 50000 different locations: 10000 each at sea level, 500 m, 1000 m, 1500 m, 2000 m. Then use the law of large numbers to reduce the net mascon uncertainty.

STRING LANDSCAPE

“The string theory landscape or anthropic landscape refers to the large number of possible false vacua in string theory.”

http://en.wikipedia.org/wiki/String_theory_landscape

“Plenty of leading physicists — prominent examples being Steve Weinberg and Martin Rees — have taken the acceleration of the cosmic expansion seriously as a hint that the landscape interpretation of the universe may be correct. ... It was so shocking that it was several years, and a lot more data, before I personally was convinced. ... The trouble with criticizing string theory because it plausibly predicts a landscape of vacua is that the landscape interpretation might be correct.” — Edward Witten in 2014 interview by John Horgan

<http://blogs.scientificamerican.com/cross-check/2014/09/22/physics-titan-edward-witten-still-thinks-string-theory-on-the-right-track/>

Consider the Milgrom Denial Hypothesis:

The main problem with string theory is that string theorists fail to realize that Milgrom is the Kepler of contemporary cosmology. Can the string landscape with contrived brane interactions model any plausible or implausible physics? Do researchers who want to test string theory need to look first at testing Milgrom’s ideas?

“... if MOND does turn out to have some truth to it, the fact that it encountered so much opposition will just show how nontrivial a thought it was.” — M. Milgrom

http://en.wikiquote.org/wiki/Mordehai_Milgrom

“... String theory doesn’t make a precise prediction for how the equivalence principle will be modified, and among the many possible universes string theory can lead to, many have no measurable modification of the equivalence principle ...” — M. Strassler

<http://profmattstrassler.com/2014/01/13/a-solar-system-test-of-string-theory/>

Do string theorists need Milgrom (because Milgrom is correct)?