Lambda-VDM Model: a Testable Modification of Lambda-CDM

ABSTRACT

Milgrom's MOdified Newtonian Dynamics (MOND) implies that the Lambda-Cold-Dark-Matter (Lambda-CDM) model is significantly wrong. Based upon a speculative, MOND-based theory of quantum gravity, this brief communication describes a Lambda-Virtual-Dark-Matter (Lambda-VDM) model that allows for precise testing of the speculative theory of quantum gravity. There are 2 basic new ideas: Idea 1 is to replace the -1/2 in the standard form of Einstein's field equations by -1/2 + dark-matter-compensation-constant, where this constant is approximately sqrt((60±10)/4)) * 10^-5. Idea 2 is that dark matter has positive gravitational mass-energy and zero inertial mass-energy and that the universe converts ordinary matter into dark matter over cosmological time; the % of ordinary matter monotonically decreases over time according to a precise formula; when the % of ordinary matter is sufficiently close to zero the entire universe undergoes an instantaneous quantum collapse. Part of Idea 2 is that dark matter is always virtual mass-energy and can never be directly measured. The Lambda-VDM model might provide a resolution of the Photon Underproduction Crisis.

MOND AND QUANTUM GRAVITY

MOND is a controversial modification of Newtonian gravitational theory.

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

What is the best argument in favor of the Fernández-Rañada-Milgrom effect?

http://vixra.org/abs/1203.0036 "Does the Rañada-Milgrom Effect Explain the Flyby Anomaly?"

String theory, the Finite Nature Hypothesis, and MOND suggest a quantum theory of gravity.

http://vixra.org/abs/1401.0226 "What Is Measurement? Why Does Measurement Exist?"

MOND suggests that there are no dark matter particles.

DARK MATTER

According to Wikipedia (July 2014), "Dark matter cannot be seen directly with telescopes; evidently it neither emits nor absorbs light or other electromagnetic radiation at any significant level. It is otherwise hypothesized to simply be matter that is not reactant to light. Instead, the existence and properties of dark matter are inferred from its gravitational effects on visible matter, radiation, and the large-scale structure of the universe."

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

"A virtual particle is not a particle at all. It refers precisely to a disturbance in a field that is not a particle." — Matt Strassler

http://profmattstrassler.com/articles-and-posts/particle-physics-basics/virtual-particles-what-are-they/

Consider 4 hypotheses:

Hypothesis 1: Dark matter obeys the equivalence principle.

Hypothesis 2: Dark matter consists of particles of unknown nature, possibly derived from supersymmetry.

Hypothesis 3: Dark matter has positive gravitational mass-energy and zero inertial mass-energy.

Hypothesis 4: Dark matter consists entirely of virtual mass-energy; there are no dark matter particles.

My quantum theory assumes that Hypotheses 1 and 2 are false and that Hypotheses 3 and 4 are true.

LAMBDA-CDM MODEL

According to Wikipedia (July, 2014), "The ΛCDM (Lambda Cold Dark Matter) or Lambda-CDM model is a parametrization of the Big Bang cosmological model in which the universe contains a cosmological constant, denoted by Lambda (Greek "Λ"), associated with dark energy, and cold dark matter (abbreviated "CDM"). … The model assumes that general relativity is the correct theory of gravity on cosmological scales. It emerged in the late 1990s as a "concordance cosmology", after a period of time when disparate observed properties of the universe appeared mutually inconsistent, and there was no consensus on the makeup of the energy density of the universe. ... The ΛCDM model is based on six parameters: physical baryon density; physical dark matter density; dark energy density; scalar spectral index; curvature fluctuation amplitude; and reionization optical depth."

http://en.wikipedia.org/wiki/Lambda-CDM_model

LAMBDA-CDM MODIFICATIONS BASED UPON QUANTUM GRAVITY

"GADGET is a freely available code for cosmological N-body/SPH simulations on massively parallel computers with distributed memory. GADGET uses an explicit communication model that is implemented with the standardized MPI communication interface. The code can be run on essentially all supercomputer systems presently in use, including clusters of workstations or individual PCs."

http://www.mpa-garching.mpg.de/gadget/ "Cosmological simulations with GADGET"

In order to modify GADGET or a similar software package for the Lambda-VDM model,

it is necessary to performs 3 tasks:

Task 1: Replace usages of Newton's gravitation theory or Einstein's field equations with suitable modifications of the code to adjust Einstein's field equations (or Newtonian

approximations) by replacing -1/2 by -1/2 + dark-matter-compensation-constant, where the constant is approximately sqrt((60±10)/4)) * 10^-5, and suitably modifying Newtonian gravitational approximations. See pages 83-89 of Einstein's "The Meaning of Relativity", 5th edition, 1956, ISBN 0-691-02352-2.

Task 2: In the Lambda-CDM simulation at time T for the age of the universe, the baryon density is a constant independent of T. The Lambda-VDM simulation requires the replacement of the constant baryon density Ω_b (= .0456 ± .0016) by

(27.36) * (1 - (T/ (81.6 billion years))) (approximately) at each time T for the age of the universe.

For T = 13.7 billion years, (27.36) * (1 - (T/ (81.6 billion years))) / Ω_b is approximately 5 so that the Photon Underproduction Crisis is explained by a cosmological underestimate of baryonic mass and not a cosmological underproduction of photons.

Task 3: In the Lambda-CDM simulation the dark matter particles have nonzero gravitational mass-energy (and obey the equivalence principle). In the Lambda-VDM simulation the dark matter particles do not exist so the mass-energy of all of the dark matter particles should be set identically equal to zero. (In the Lambda-VDM simulation the dark matter is entirely virtual and has positive gravitational energy that is already accounted for by giving the dark-matter-compensation-constant a nonzero value.)

MOND AND PHOTON UNDERPRODUCTION CRISIS

Are the majority of astrophysicists wrong about dark matter particles? MOND challenges Newton-Einstein gravitational theory. Does cosmological evidence indicate that Newton-Einstein gravitational theory is significantly wrong?

Kollmeier et al. wrote, "We examine the statistics of the low-redshift Lyman-alpha forest from smoothed particle hydrodynamic simulations in light of recent improvements in the estimated evolution of the cosmic ultraviolet background (UVB) and recent observations from the Cosmic Origins Spectrograph (COS). We find that the value of the metagalactic photoionization rate required by our simulations to match the observed properties of the low-redshift Lyman-alpha forest is a factor of 5 larger than the value predicted by state-of-the art models for the evolution of this quantity."

http://arxiv.org/abs/1404.2933 "The Photon Underproduction Crisis", 10 April 2014

The so-called "Photon Underproduction Profile Prediction" (PUPP) is unsatisfactorily vague. I lack understanding of the "metagalactic photoionization rate". Giving the most natural interpretation to PUPP, it is almost certainly false. However, appropriate adjustments might lead to a modified PUPP that is empirically valid. There are many problems involved in calculating the "metagalactic photoionization rate".

http://vixra.org/abs/1407.0088 "MOND and the Photon Underproduction Crisis"

The basic idea of PUPP is that the “Photon Underproduction Crisis” is resolved by the Lambda-VDM model. In other words, replace PUPP by the conjecture that the Lambda-VDM model is empirically valid.