

A New (Old) Formula for Acceleration

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It is proposed that acceleration be quantized.

It is time to take the absence of 'dark matter' seriously. Also it is time to inject a new form of physics into consideration.

The formula that I propose goes back to Milgrom's idea [2] of the 1980s (see also [3]).

It is that acceleration should be quantized. Instead of the (magnitude of the) acceleration being GM/r^2 (where G = Gravitational constant, M is the mass of the body causing the acceleration, and r is the distance from that body) it is $a(r) = GM/r^2 a_0$ where a_0 is a new constant of Nature (about 10^{-10}m/s^{-2}). Thus for sufficiently small values of GM/r^2 the acceleration will be the square of the usual value (times $1/a_0$) and for larger values it will be the usual.

Why this formula? Because it works (see [2] and [3]).

Explanation. The probable number of acceleration excitations is $GM/r^2 a_0$, where a_0 has the dimensions of acceleration. If this number is order of unity or less, then $x = \text{Prob}(\text{that it is excited}) \times \text{the effect of the force (which is } GM/r^2)$, so it's $xGM/r^2 = a^2/a_0$ (with a the usual acceleration = GM/r^2), as Milgrom states. For $x > 1$ the probability is one and all that is left is a single factor of GM/r^2 .

There have been other changes in the Einstein equations [1] which are less radical than this.

References

- [1] Jacob D. Bekenstein. The modified Newtonian dynamics—MOND and its implications for new physics. *Contemporary Physics*, 47:387, 2006. Also found at arXiv 0701848v2.
- [2] M. Milgrom. A modification of the Newtonian dynamics as a possible alternative to the hidden mass hypothesis. *Astrophys. J.*, 270:365–370, 1983.
- [3] Mordehai Milgrom. Does dark matter really exist? *Sci. Am.*, pages 42–52, 2002(8).