Short Communication

Cosmological Constants

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ABSTRACT: TOne possible explanation for the small but non-zero value was noted by Steven Weinberg in 1987 following the anthropic principle.[21] Weinberg explains that if the vacuum energy took different values in different domains of the universe, then observers would necessarily measure values similar to that which is observed: the formation of life-supporting structures would be suppressed in domains where the vacuum energy is much larger. Specifically, if the vacuum energy is negative and its absolute value is substantially larger than it appears to be in the observed universe (say, a factor of 10 larger), holding all other variables (e.g. matter density) constant, that would mean that the universe is closed; furthermore, its lifetime would be shorter than the age of our universe, possibly too short for intelligent life to form. On the other hand, a universe with a large positive cosmological constant would expand too fast, preventing galaxy formation. According to Weinberg, domains where the vacuum energy is compatible with life would be comparatively rare. Using this argument, Weinberg predicted that the cosmological constant would have a value of less than a hundred times the currently accepted value.[22] In 1992, Weinberg refined this prediction of the cosmological constant to 5 to 10 times the matter density.[23]This argument depends on a lack of a variation of the distribution (spatial or otherwise) in the vacuum energy density, as would be expected if dark energy were the cosmological constant. There is no evidence that the vacuum energy does vary, but it may be the case if, for example, the vacuum energy is (even in part) the potential of a scalar field such as the residual inflaton (also see quintessence). Another theoretical approach that deals with the issue is that of multiverse theories, which predict a large number of "parallel" universes with different laws of physics and/or values of fundamental constants. Again, the anthropic principle states that we can only live in one of the universes that is compatible with some form of intelligent life. Critics claim that these theories, when used as an explanation for fine-tuning, commit the inverse gambler's fallacy.In 1995, Weinberg's argument was refined by Alexander Vilenkin to predict a value for the cosmological constant that was only ten times the matter density,[24] i.e. about three times the current value since determined.

Biography

Marta Acín-Albiac got her Bsc. in Food Science at University of Barcelona (UB) and she got specialized during her Msc. cosmological constants

Recent Publications

1. Baker, J. C.; Grainge, K.; Hobson, M.P.; Jones, M.E.; Kneissl, R.; Lasenby, A.N.; O'Sullivan, C.M. M.; Pooley, G.; Rocha, G.; Saunders, R.; Scott, P.F.; Waldram, E.M.; et al. (1999). "Detection of cosmic microwave background structure in a second field with the Cosmic Anisotropy

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3. Gamow, G. (1956). "The evolutionary universe". Scientific American. 195 (3): 136–156. Bibcode:1956SciAm.195c.136G. doi:10.1038/scientificamerican0956-136. JSTOR 24941749.

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Citation: Marta Acín-Albiac, Metabolic preference of fructiphilic lactic acid bacteria for fructose: a way to reduce FODMAPS in wheat-derived baked goods cosmological constants

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