Dirac dates birth of universe

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1078 said Dirac, "Actually it is a few particles less, but we don't know how much less, because we don't know how much unobscured matter there really is.

Since this number is the square of 1078, and since the large number hypothesis postulates that all such dimensionless large numbers are related, Dirac claimed "we must conclude this number (of nucleons) is increasing proportionately with the square of the epoch. This requires matter to be continuously created."

Dirac compared this with the "steady state" theory of creation, which also postulates matter creation, but explained that they were not the same "because we have G varying. We have continuous creation of matter together with the big bang as the origin of the universe." The "big bang" theory itself is unacceptable under the large number hypothesis, Dirac said, because "the time at which the universe reaches its largest size would be a constant and a large number in atomic units and thus cannot be allowed -- any large number constant can be ruled out." There are two different ways this new matter could be created, explained Dirac: the additive and the multiplicative theories of creation. The additive theory says that new matter is created uniformly throughout the whole of space, and thus "most of it is created in intergalactic space," while the multiplicative theory says that "new matter is created where it already exists and proportionately to the amount there." While the multiplicative theory would maintain conservation of mass by decreasing the amount of mass in each proton and thus keeping the names of objects constant, the only way to preserve conservation of mass as required by relativity with the additive theory, according to Dirac, would be to "imagine some 'negative mass' being created so that the total mass remains zero."

"This is a very artificial situation," said Dirac, but "I don't see any escape from it if we start with the large number hypothesis."

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