Exploration

On the Embryo of Matter

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Abstract

In this essay, we propose positronium (Ps) with Z=0 as the embryo of matter which exists in our observational Universe.

Keywords: Embryo, matter, positronium, existence, university.

God made the integers, all else is the work of man - L. Kronecker

Introduction

It is well known that set of natural numbers (from XX century) looks like

0, 1, 2, 3, 4, 5,…

In contrary contemporary, Mendeleyev`s set is in the form

Z =1, 2, 3, 4, 5,…..

where Z is the atomic number.

According to Freeman Dyson's calculation, our Universe after T= 10^{34} years ends with positronium particles. Following the CTP principle, I guess that our Universe starts with positronium as the embryo particles also. In that case, we are obliged to add the positronium with Z=0 as the first "nucleus" in Mendeleyev`s table and the new Natural Mendeleyev Table looks like

Z=0, 1, 2, 3

2. Historical Background

The most primitive method of representing a natural number is to put down a mark for each object. Later, a set of objects could be tested for equality, excess or shortage—by striking out a mark and removing an object from the set.

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The first major advance in abstraction was the use of numerals to represent numbers. This allowed systems to be developed for recording large numbers. The ancient Egyptians developed a powerful system of numerals with distinct hieroglyphs for 1, 10, and all powers of 10 up to over 1 million. A stone carving from Karnak, dating back from around 1500 BCE and now at the Louvre in Paris, depicts 276 as 2 hundreds, 7 tens, and 6 ones; and similarly for the number 4,622. The Babylonians had a place-value system based essentially on the numerals for 1 and 10, using base sixty, so that the symbol for sixty was the same as the symbol for one—its value being determined from context.

A much later advance was the development of the idea that 0 can be considered as a number, with its own numeral. The use of a 0 digit in place-value notation (within other numbers) dates back as early as 700 BCE by the Babylonians, who omitted such a digit when it would have been the last symbol in the number. The Olmec and Maya civilizations used 0 as a separate number as early as the 1st century BCE, but this usage did not spread beyond Mesoamerica.

The use of a numeral 0 in modern times originated with the Indian mathematician Brahmagupta in 628 CE. However, 0 had been used as a number in the medieval computus (the calculation of the date of Easter), beginning with Dionysius Exiguus in 525 CE, without being denoted by a numeral (standard Roman numerals do not have a symbol for 0). Instead, *nulla* (or the genitive form *nullae*) from *nullus*, the Latin word for "none", was employed to denote a 0 value.

The first systematic study of numbers as abstractions is usually credited to the Greek philosophers Pythagoras and Archimedes. Some Greek mathematicians treated the number 1 differently than larger numbers, sometimes even not as a number at all.] Euclid, for example, defined a unit first and then a number as a multitude of units, thus by his definition, a unit is not a number and there are no unique numbers (*e.g.*, any two units from indefinitely many units is a 2).

Independent studies on numbers also occurred at around the same time in India, China, and Mesoamerica.

In 19th century Europe, there was mathematical and philosophical discussion about the exact nature of the natural numbers. A school of Naturalism stated that the natural numbers were a direct consequence of the human psyche. Henri Poincaré was one of its advocates, as was Leopold Kronecker, who summarized his belief as "God made the integers, all else is the work of man" [2].

In opposition to the Naturalists, the constructivists saw a need to improve upon the logical rigor in the foundations of mathematics.[h] In the 1860s, Hermann Grassmann suggested a recursive definition for natural numbers, thus stating they were not really natural—but a consequence of definitions. Later, two classes of such formal definitions were constructed; later still, they were shown to be equivalent in most practical applications.

Set-theoretical definitions of natural numbers were initiated by Frege. He initially defined a natural number as the class of all sets that are in one-to-one correspondence with a particular set. However, this definition turned out to lead to paradoxes, including Russell's paradox. To avoid such paradoxes, the formalism was modified so that a natural number is defined as a particular set, and any set that can be put into one-to-one correspondence with that set is said to have that number of elements.

The second class of definitions was introduced by Charles Sanders Peirce, refined by Richard Dedekind, and further explored by Giuseppe Peano; this approach is now called Peano arithmetic. It is based on an axiomatization of the properties of ordinal numbers: each natural number has a successor and every non-zero natural number has a unique predecessor. Peano arithmetic is equiconsistent with several weak systems of set theory. One such system is ZFC with the axiom of infinity replaced by its negation. Theorems that can be proved in ZFC but cannot be proved using the Peano Axioms include Goodstein's theorem.

With all these definitions, it is convenient to include 0 (corresponding to the empty set) as a natural number. Including 0 is now the common convention among set theorists and logicians. Other mathematicians also include 0, and computer languages often start from zero when enumerating items like loop counters and string- or array-elements. On the other hand, many mathematicians have kept the older tradition to take 1 to be the first natural number.

3. Positronium Strong Interaction

e`e ~ an annihilation into quark-antiquark pairs is a valuable platform for the investigation of the strong interaction. The level of sophistication reached by theory and experiment allows one to verify predictions with significant precision for centre-of-mass energies ranging from the lepton mass up to about 200 GeV. Determinations of a strong interaction from total cross-sections, hadronic branching fractions of the q lepton and of heavy quarkonia, jet rates, and event shape observables confirm the energy dependence of the strong coupling constant. Experimental studies of theoretical approaches to hadronization are presented.

Besides fragmentation functions, scaling violations, and longitudinal cross-sections, successes of the modified leading-logarithmic approximation. Power suppressed corrections, which are expected to be related to hadronization, are discussed for mean values and distributions of event shape observables. From the energy dependence of the strong interaction missing higher-order terms of the perturbation series can be determined. The scrutiny of the scale dependence of strong interactions showed no evidence for power corrections, light gluinos, or anomalous strong couplings

4. Conclusion

For the moment, the Beginning and the End of the Universe are still debated. In this essay, following the ideas of Freeman Dyson and Bertrand Russell we argue that, at both the Beginning and End, positronium played the leading role. Moreover, we suggest that the Natural Mendeleyev Table can be enriched by the zero Z number "nucleus" – positronium.

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References

1. Dyson, F., 1979, Rev. Mod. Phys., (51): 447.

2. Russell B., 1919, Introduction to Mathematical Philosophy, George Allen and Unwin, Ltd, London.