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Examples of Neutrosophic Probability in Physics

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Abstract: This paper re-discusses the problems of the so-called “law of nonconservation of parity” and “accelerating expansion of the universe”, and presents the examples of determining Neutrosophic Probability of the experiment of Chien-Shiung Wu et al in 1957, and determining Neutrosophic Probability of accelerating expansion of the partial universe.

Keywords: Neutrosophic Probability, law of nonconservation of parity, accelerating expansion of the universe .

1 Introduction

According to reference [1], Neutrosophic probability is a generalization of the classical and imprecise probabilities. Several classical probability rules are adjusted in the form of neutrosophic probability rules. In some cases, the neutrosophic probability is extended to n-valued refined neutrosophic probability.

The neutrosophic probability is a generalization of the classical probability because, when the chance of indeterminacy of a stochastic process is zero, these two probabilities coincide.

The Neutrosophic Probability that an event A occurs is

$$NP(A) = (ch(A), ch(neutA), ch(antiA)) = (T, I, F)$$

where T, I, F are standard or nonstandard subsets of the nonstandard unitary interval $]^-0, 1^+[$, and T is the chance that A occurs, denoted $ch(A)$; I is the indeterminate chance related to A, $ch(neutA)$; and F is the chance that A does not occur, $ch(antiA)$.

This paper presents some examples of Neutrosophic Probability in physics.

2 Determining Neutrosophic Probability of the experiment of Chien-Shiung Wu et al in 1957

One of the reasons for 1957 Nobel Prize for physics is “for their penetrating investigation of the so-called parity laws which has led to important discoveries regarding the elementary particles”, and according to the experiment of Chien-Shiung Wu et al in 1957, the so-called “law of nonconservation of parity” is established. While, according to the viewpoint of Neutrosophic Probability, this conclusion should be re-discussed.

Supposing that event A denotes parity is conservation, $antiA$ denotes parity is nonconservation, and $neutA$ denotes indeterminacy.

In the experiment of Chien-Shiung Wu et al in 1957, they found that the number of the electrons that exiting angle $\theta > 90°$ is 40% more than that of $\theta < 90°$ (the ratio is 1.4:1.0). For this result, we cannot simply say that parity is conservation or nonconservation. The correct way of saying should be that, besides indeterminacy, the chance of conservation of parity is as follows

$$ch(A) = 1.0/1.4 = 71\%$$

and the chance of nonconservation of parity is as follows

$$ch(antiA)) = (1.4 – 1.0)/1.4 = 29\%$$

Thus, the Neutrosophic Probability that “parity is conservation” is as follows

$$NP(A) = (ch(A), ch(neutA), ch(antiA)) = (71\%, 0, 29\%)$$

It should be noted that, for the reason that we cannot know the indeterminacy, so we suppose that it is equal to 0.

In reference [2] we point out that, the essential reason for the phenomena of nonconservation (including nonconservation of parity, momentum, angular momentum and the like) is that so far only the “law of conservation of energy” can be considered as the unique truth in physics. As for other “laws”, they are correct only in the cases that they are not contradicted with law of conservation of energy or they can be derived by law of conservation of energy.

Similarly, the Neutrosophic Probability for other laws of conservation should be determined by law of conservation of energy or experiment (currently for most cases the Neutrosophic Probability can only be determined by experiment, like the experiment of Chien-Shiung Wu et al in 1957).

3 Determining Neutrosophic Probability of accelerating expansion of the partial universe

One of the reasons for 2011 Nobel Prize for physics is "for the discovery of the accelerating expansion of the universe through observations of distant supernovae". But "the accelerating expansion of the universe" is debatable, and Neutrosophic Probability of the accelerating expansion of the partial universe should be determined.

In 1929, Hubble, an astronomer of the United States, found the famous Hubble's law. According to Hubble's law, some scholars reach the conclusion of the accelerating expansion of the universe. But "the accelerating expansion of the universe" is debatable. Due to the observation of distance is limited and the observation time is also limited, at most we can say: "partial universe is in the state of expansion (including accelerating expansion) for limited time."

Firstly we discuss the unreasonable results caused by Hubble's Law.

Hubble's law reads

$$V = H_0 \times D \qquad (1)$$

where： V —（galaxy's） far away speed, unit: km/s； H_0 —Hubble's Constant, unit: km/(s . Mpc)； D —（galaxy's） far away distance, unit: Mpc.

According to Hubble's law, we have

$$V = \frac{dD(t)}{dt} = H_0 \times D(t) \qquad (2)$$

From this differential equation, it gives

$$D = ke^{H_0 t} = k\exp(H_0 t) \qquad (3)$$

where： k — a constant to be determined; if we assume that the distance is positive, then its value is positive too.

It gives the far away speed as follows

$$V = kH_0 \exp(H_0 t) \qquad (4)$$

The far away acceleration is as follows

$$a = dV/dt = kH_0^2 \exp(H_0 t) \qquad (5)$$

According to Newton's second law, the force acted on this galaxy is as follows

$$F = ma = mkH_0^2 \exp(H_0 t) \qquad (6)$$

Based on these equations, apparently we can reach the unreasonable conclusions: as time tends to infinity, all of the values will tend to infinity too.

If Hubble's law needs to be amended, the conclusion of "the accelerating expansion of the universe" also needs to be amended. At least it should be amended as "the accelerating expansion of the partial universe."

Secondly we discuss the states of contraction and the like of the partial universe.

Many scholars have presented the state of contraction of the universe (or partial universe). Here we stress that partial universe (such as the area nearby a black hole) is in the state of contraction.

As well-known, the mass of black hole (or similar black hole) is immense, and it produces a very strong gravitational field, so that all matters and radiations (including the electromagnetic wave or light) will be unable to escape if they enter to a critical range around the black hole.

The viewpoint of "the accelerating expansion of the universe" unexpectedly turns a blind eye to the fact that partial universe (such as the area nearby a black hole) is in the state of contraction.

To sum up, considering all possible situations, the correct conclusion is that there exist at least seven states of accelerating expansion and contraction and the like in the universe, namely "partial universe is in the state of accelerating expansion, partial universe is accelerating contraction, partial universe is uniform expansion, partial universe is uniform contraction, partial universe is decelerating expansion, partial universe is decelerating contraction, and partial universe is neither expansion nor contraction (this may be the static state)". As for the detailed study for these seven states, it will be the further topic in future.

Besides these seven states, due to the limitations of human knowledge and the like, there may be other unknown states or indeterminacy states.

Supposing that the chance of getting indeterminacy ch(indeterm) = 9%, and the chance of accelerating expansion of the partial universe is equal to the chance of other states, thus the Neutrosophic Probability that "accelerating expansion of the partial universe (*A*)" is as follows

NP (*A*) = (*ch*(*A*) ,*ch*(*neutA*) ,*ch*(*antiA*)) = (13*%, 9%, 78%*)

While, according to the classical probability, the probability that "accelerating expansion of the partial universe" is equal to 1/7 (14.2857%).

4 Conclusions

The problems of the so-called "law of nonconservation of parity" and "the accelerating expansion of the universe" should be re-discussed. The Neutrosophic Probability that "parity is conservation" is (*71%, 0, 29%*), and the Neutrosophic Probability that "accelerating expansion of the partial universe" is (13*%, 9%, 78%*).

References

[1] Florentin Smarandache, Introduction to Neutrosophic Measure, Neutrosophic Integral, and Neutrosophic Probability, Sitech-Education, 2004

[2] Fu Yuhua, Conservation of Energy Leads to Probability Conservation of Parity, Momentum and so on, http://www.gsjournal.net/Science-Journals/Essays/View/5425

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