Acta Scientific Applied Physics

Volume 3 Issue 4 April 2023

Short Communication

Is it Possible to Define Some Extensions of Uncertainty Principle

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Received: February 15, 2023

Published: March 19, 2023

In physics and mathematics it is always possible to think, derive or predict extensions of some principles, some theories. Emma Noether is the best example, she imagined and derived a relation between symmetries and conserved quantities. In a dynamical system always there exists a conserved quantity for each symmetry of the system.

In the history of science continously many theorems, principles were studied, and when some inconsistincies, some deficiensies were observed then new extended theories were formulated. Or in some cases new extensions were predicted. Emma Noether is the one of most remarkable example, she predicted a relation between symmetries and conserved quantities for a dynamical system [1]. For my phd thesis "relativistic cosmology models", a simple proof for one scalar field and flat space time were extended for N scalar fields and curved space time [2].

Also it is possible to discuss and rederive some principle of quantum mechanics, and to extend and predict their new forms. Depending on observations, their validity may be observed. Heisenberg derived and postulated his famous uncertainty principle. It states that simultaneously an object position and momentum can not be measured exactly.

$$\Delta p\,\Delta x > \frac{\hbar}{2};\quad \Delta E\,\Delta t > \frac{\hbar}{2}$$

$$\hbar = 6.582\,10^{-16}\,eV\,s$$

The dimesion of Planck constant is the product of energy and time, and the product of momentum and position is as well. By analogy it must be possible to predict other uncertainty principles for all other quantum scale constants. For example Boltzmann constant and quantum scale

$$k_B = 8.617\,10^{-5}\frac{eV}{K}$$

Its dimension is the product of energy and inverse of Kelvin temperature, by analogy it maybe predicted an uncertainty principle in such a way

$$\Delta E\,\Delta\frac{1}{K} \approx k_B$$

By the analogy, this may be interpreted as there must be an uncertainty for a quantum scale physical system in such way at the same time simultaneously, the energy and the inverse of the system temperature can not be measured.

Bibliography

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