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Quantum Electrothermodynamics

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Quantum Theory has been a hard-to-grasp concept since it's very beginning. Quantum electrodynamics is the study of the electrical characteristics of quantum fields and Quantum thermodynamics is the study if thermal energy at a quantum scale. In Quantum Electrothermodynamics, I present the idea that electrodynamics and thermodynamics are actually connected and are two sides of the same coin. Quantum Electrothermodynamics is a way of unifying the two domains and make them into one by identifying the correlation between both.

$$[\{T\uparrow\} \rightarrow \{\rho\downarrow f\uparrow\} \rightarrow \{S\uparrow\} \rightarrow \{\Omega(Q)\uparrow \Omega(Q')\downarrow\} \rightarrow \{\sigma(Q)\downarrow \sigma(Q')\uparrow\} \{(\lambda stab \downarrow \}]$$

$$\{T\uparrow\} \rightarrow \{\rho\downarrow f\uparrow\}$$

Increasing the temperature of a system reduces its density and increases it's frequency. We can observe this by simply increasing the temperature of an atomic nuclei of Cesium-133 in an atomic clock which would increase it's frequency and reduce its observable density and changing the resulting time we get from the clock.

$$\{S\uparrow\} \rightarrow \{\Omega(Q)\uparrow \Omega(Q')\downarrow\}$$

High temperature leads to high rate of entropy which increases electrical resistance and decreases thermal resistance of the system. This is because a system with high temperature leads to non linearity, causing an unusual flow of energy in the system further leading to entropy.

$$\{\sigma(Q)\downarrow \sigma(Q')\uparrow\} \{(\lambda stab \downarrow \}$$

The system loses electrical conductivity and gains thermal conductivity with increase in temperature, this leads to overall decrease in the stability of the system. This is because the system is not dynamic. The more the temperature will be, lesser dynamic it will get which would reduce the overall stability and therfore the predictability of the system.

A system with dynamicity will have low resistance, low entropy and high electrical conductivity where as a system with non linearity will have high entropy, high electrical resistance and minimal or none electrical conductivity.

Dynamics and Non Linearity

$$(\lambda = d) = [T\downarrow \rho\uparrow f\downarrow]\ [\Omega\downarrow \sigma\uparrow S\downarrow]$$

$$(\lambda = d) = \lambda stab$$

$$(\lambda \neq d) = [T\uparrow \rho\downarrow f\uparrow]\ [\Omega\uparrow \sigma\downarrow S\uparrow]$$

$$(\lambda \neq d) = \lambda mess$$

In a dynamic system,	In a non linear system,
• Temperature is low	• Temperature is high
• Density is high	• Density is low
• Frequency is low	• Frequency is high
• Resistance is low	• Resistance is high
• Conductivity is high	• Conductivity is low
• Entropy is low	• Entropy is high

Dynamic Systems

Quantum fields that are in a dynamic state have low temperature range, high density and low frequency of oscillation. These systems have low electrical resistance, high electrical conductivity and low to none rate of entropy. Dynamic energy fields have high stability.

In a dynamic system that has high density, low frequency and low temperature range, time has a linear motion forward relative to the density of the system.

Example: Heavy metals are dense and have high melting point and also have high electric conductivity and low rate of resistance, this is because the atoms of these elements are dense due to the higher proton and neutron count and low frequency. This makes heavy elements more dynamic and stable.

Non Linear Systems

Quantum fields in a non linear state have a high temperature range, low density and high frequency of oscillation.These systems have high electrical resistance and low electrical conductivity. Non linear systems have high rate of entropy and are highly unstable.

In a non linear system that has low density, high frequency and high temperature range, time will have a non linear motion. In such a system, time can virtually run backwards enabling particles to go back and forth in time.

Example: Lighter elements like hydrogen are less stable and can be made into plasma due to their high reactivity to thermal energy. These elements also have low density, high frequency and rate of entropy.

Electricity and Entropy

$$(\lambda)\ S \rightarrow (\beta)\ Q$$

When entropyin initial system goes to an outside field, or fields, it gets converted into electric charge. The basic working principle of a thermoelectric transducer.

$$(\lambda)\ Q \rightarrow S \propto (\lambda)\ \Omega\ T$$

Charge in a given system gets converted into entropy (S) relative to the system's rate of resistance and it's temperature.

- Electric charge becomes thermal energy (entropy) and thermal energy becomes energy when entering external systems.

- The amount of entropy produced in a system is relative to the resistance temperature of the system.
- Objects with high resistance heat up faster and also catch fire easily because of their nature at a quantum scale.

Effects of temperature and density

Behavior of quantum fields is most importantly governed by temperature and density. They determine the fate of the system. A system with high temperature will have low density and stability, which tells us about the effects it would cause- like high rate of entropy and frequency in the system. We can tell that the system is non linear by observing high temperature range in the system. This type of system would be more thermodynamic than electrodynamic. In a quantum thermodynamic system energy/charge would get converted mainly into entropy and be less predictable.

Example: Water boils faster than oil, simply because of the difference between density and dynamicity of the two.

A system with high density will have low temperature range and will be more stable. Such a system would be more electrodynamic and have low entropy and frequency, high electric conductivity and low resistance. In a quantum electrodynamic system, energy (especially thermal) would get converted into electric charge.

Example: The whole idea of quantum levitation and superconductors is based upon systems that are cold and dense and therfore more stable and dynamic.

References

Quantum levitation and superconductors:
https://youtu.be/sFOrdHiinsc

Conclusion

- Electric systems are dynamic, thermal systems are non linear.
- The conditions of a system can tell us about the linearity of the system.
- Dynamic Systems are more stable and non linear systems are less stable.
- Entropy becomes electric charge when it goes from one system to the other.
- Electric charge becomes entropy relative to the rate of resistance of the system.
- The temperature of a system governs it's density, frequency, electric/thermal conductivity/resistance and the overall stability of the whole system.
- Increasing the temperature of a system increases it's non linearity proportional to the rise in temperature.

Future Scope

We can observe fields and systems using temperature and density as the main frames of reference to determine the characteristics of the system. This would help us to understand the universe better with the help of quantum mechanics. It would enables us to make use of quantum fields by giving us a better picture of how things work on a minuscule scale.

Author Profile

Ansh Lalwani is an independent researcher and science enthusiast currently studying in 12th grade science-maths, he intends to dedicate his life to the development of science and technology. His primary domain of research is quantum mechanics, he also works with particle physics.