



[original insight]

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# The insight behind the discovery of quanta by Max Planck

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## Abstract

We explore the origin of Planck's insight,  $E = h\nu$ .

keywords: quantum, Planck, energy, frequency

## From the equipartition theorem to $E = h\nu$

1. "In classical statistical mechanics, the equipartition theorem relates the temperature of a system to its average energies" [1, 2].
2.  $k_B$  is the Boltzmann constant, and  $T$  is the temperature of a physical system.
3. The quantity  $E = k_B T$  is a measure of energy.
4. Temperature is related to oscillation, so  $T \propto \nu$ , where  $\nu$  is the frequency of oscillation.
5. From (3) and (4), one can relate energy and frequency by writing  $E = h\nu$ .
6.  $h$  is the Planck's constant.

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# Final Remarks

7. We did not explain the discretization of energy exchanges that happen within the quantum realm.
8. Instead, we gave the physical interpretation on the origin of the energy-frequency proportionality in the formula  $E = h\nu$ .

# Open Invitation

*Review, add content, and co-author* this paper [3, 4]. *Join* the **Open Physics Collaboration**. Send your contribution to mplobo@uft.edu.br.

# Ethical conduct of research

This original work was pre-registered under the OSF Preprints [5], please cite it accordingly [6]. This will ensure that researches are conducted with integrity and intellectual honesty at all times and by all means.

# References

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