



[original insight]

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On the wave-particle duality: mass and frequency

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Abstract

The Nobel achievement on the wave-particle duality is presented in a very logical approach.

keywords: wave-particle duality, mass, energy, frequency, De Broglie

The most updated version of this white paper is available at

<https://osf.io/9xa6v/download>

<https://zenodo.org/record/7626519>

Mass has a frequency

1. Energy and mass are connected by $E = mc^2$ [1].
2. Energy and frequency are connected by $E = h\nu$ [2–4].
3. Therefore, from (1) and (2), we can conclude that **mass has a frequency**, namely, $m = \frac{h\nu}{c^2}$.
4. In **quantum mechanics**, **particle** is a **wave** and **wave** is a **particle**.

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5. The expression for momentum, $p = \frac{h}{\lambda}$, tells us that in *quantum mechanics* (h), *particles* (p) behave as *waves* (ν) and vice versa.

Final Remarks

6. We showed the connection between **particles** and **waves**.
7. De Broglie received the Nobel Prize (in 1929) for discovering the wave-particle duality [5–7].

Open Invitation

Review, add content, and co-author this white paper [8, 9].

Join the **Open Physics Collaboration**.

Send your contribution to `mplobo@uft.edu.br`.

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The **latex file** for this *white paper* together with other *supplementary files* are available in [10, 11].

How to cite this paper?

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+ **Open Science Framework**

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Agreement

All authors agree with [9].

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