

de Broglie

“When I began to consider these difficulties I was chiefly struck by two facts. On the one hand the Quantum Theory of Light cannot be considered satisfactory, since it defines the energy of a light-corpuscule by the equation $W=h\nu$, containing the frequency ν . Now a purely corpuscular theory contains nothing that enables us to define a frequency: for this reason alone therefore we are compelled in the case of Light to introduce the idea of a corpuscule and that of periodicity simultaneously.

On the other hand determination of a stable motion of electrons in the atom introduces integers; and up to this point the only phenomena involving integers in Physics were those of interference and of normal modes of vibration. This fact suggested to me the idea that electrons too could not be regarded merely as corpuscles but that periodicity must be assigned to them also. In this way, then, I obtained the following general idea, in accordance with which I pursued my investigations: that it is necessary in the case of Matter, as well as of radiation generally and Light in particular, to introduce the idea of the corpuscule and of the wave simultaneously; or in other words, in the one case as well as in the other, we must assume the existence of corpuscles accompanied by waves. But corpuscles and waves cannot be independent of each other.”¹

John S. Bell

“While the founding fathers agonized over the question ‘particle’ or ‘wave’ de Broglie 1925 proposed the obvious answer ‘particle, *and* ‘wave’. Is it not clear from the smallness of the scintillation on the screen that we have to do with a particle? And is it not clear, from diffraction and interference patterns, that the motion of the particle is directed by a wave? De Broglie showed in detail how the motion of the particle, passing through just one of the two wholes in screen, could be influenced by waves propagating through both holes. And so influenced that the particle does not go where the waves cancel out, but is attracted to where they cooperate. This idea seems to me so natural and simple, to resolve the wave-particle dilemma in such a clear and ordinary way, that it is a great mystery to me that it was so generally ignored. Of the founding fathers only Einstein thought that de Broglie was on the right lines...it was rediscovered and more systematically presented in 1952 by David Bohm”.²

¹ De Broglie L. (1939) Matter and Light. The New Physics. p 168-69 New York W.W.Norton&CO Inc.

<http://archive.org/details/matterandlightth000924mbp>

² Bell J.S., 2004. *Speakable and Unspeakable in Quantum Mechanics*. p. 191. Cambridge University Press.

Original Bell, J.S. (1986). *Six possible worlds of quantum mechanics*. Proceedings of the Nobel Symposium 65: Possible worlds in Arts and Sciences. Stockholm.

See also Holland, P. (2000). *The Quantum theory of motion. An account of the de Broglie-Bohm Causal Interpretation of Quantum Mechanics*. Cambridge University Press