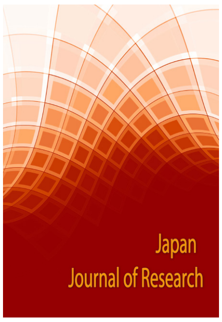

Redeeming Albert Einstein in Debates with Niels Bohr Regarding Wave-Particle Duality and Restoring Objectivity to Science

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Abstract

To explain Young's Double Slit Experiment Niels Bohr postulated his Complementarity Principle according to which if the observation is for interference pattern the particle will change to wave. Albert Einstein had objected: how can inanimate particle know what the observation is about? Experiments have confirmed Bohr's Complementarity Principle. Upon investigation, the author was able to explain all experiments without invoking Complementarity Principle, using only coherence and alignment considerations. This research recently culminated in revolutionary finding by the author, that particle always remains particle and its wave function always remains wave, no mysterious change from particle to wave or vice-versa and published a paper in the Journal of High Energy Physics and Cosmology (JHEPGC), 9, 596 – 601, widely acclaimed by readership and reviewers. It restores objectivity to science and opens new vistas of research developing new concepts, advancing science.

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Redeeming Albert Eistein

Who was correct about wave-particle duality? Niels Bohr or Albert Einstein?

Niels Bohr was correct, Albert Einstein was also correct
1925 Photograph by Ehrenfest (Wikipedia)

Wave Particle Duality: Particle Always Remains Particle and Its Wave Function Always Remains Wave

The Revolutionary Finding

Divisible Wave Function follows all probable paths, defining probability for each, while the indivisible particle follows only one path, as illustrated in Figure 1 for reflection and transmission and for Young's Double Slit Experiment, the subject of Niels Bohr – Albert Einstein debates on Wave – Particle Duality.

In the case of beam splitter, there are two potential paths that the photon can take: reflected path with probability r and transmitted path with probability t, probabilities r and t determined by the physics of interaction of the photon with the surface – for reflected path as if the photon was reflected and for transmitted path as if photon was transmitted. In the case of Young's Double Slit Experiment, when a single photon is incident on the screen with two slits, there are two potential paths, one through each slit. In the path through the upper slit

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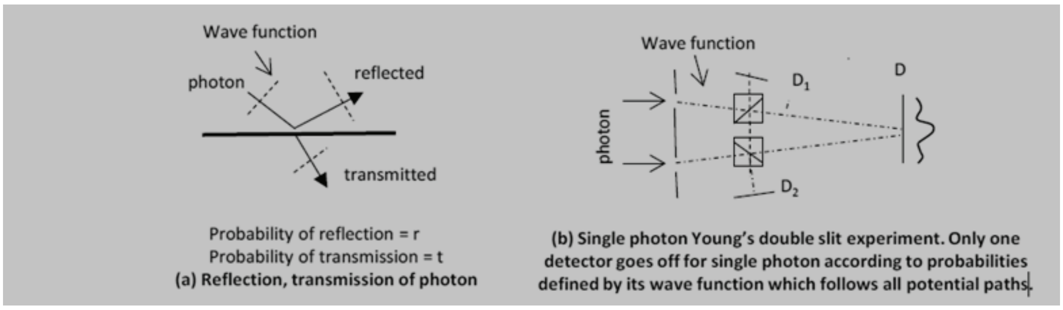

***Figure 1**. Indivisible particle follows only one path, its divisible wave function follows all paths.*

there is a beam splitter with two potential paths, one reflected and one transmitted. Likewise for the path through lower slit. Divisible wave function of the single incident photon follows all potential paths, defining probabilities for each potential path. Experimental results have shown that when a single photon is incident, only one detector goes off, either D1 or D2 or a single detector D in the array at the final screen. That is, the indivisible particle follows only one of the potential paths according to probability. When successive single particle are incident, the statistics of the counts at detectors D1, D2 and those in array D are the probabilities defined by the wave function for each of them; the complex probability amplitude is the vector sum of complex probability amplitudes of wave function components reaching through both slits, and if the coherence length and corresponding coherence time are larger than path difference, and are sufficiently aligned in direction and polarization, a stable interference pattern is observed at array D, no mysterious change from particle to wave or vice-versa.

Conflict of interest

The author declares no conflicts of interest regarding the publication of this paper.

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