What needs to be known about the 'Collapse' of Quantum-Mechanical 'Wave-Function'

Hasmukh K. Tank
Indian Space Research Organization, 22/693 Krishna Dham-2, Vejalpur, Ahmedabad-380015
India

Abstract

Quantum mechanical wave function predicts probabilities of finding a 'particle' at different points in space, but at the time of detection a particle is detected only at one place. The question is: how this place gets decided, and can be predicted. To seek answer to this, we assume here that a 'particle' has a 'diameter' equal to its 'Compton-wavelength', and depending upon the relative velocity between this particle and observer, its Compton-wavelength experiences 'Relativistic length-contraction'. Then we Fourier-transform this 'length-contraction' in 'space-domain' into 'spectral-expansion' in 'frequency-domain', and find that momentum of a particle can be expressed as: $m\,v = h\,\Delta\omega / 2\,\pi\,c$, and de Broglie's wavelength, $\lambda_B = 2\,\pi\,c / \Delta\omega$; as was derived in [ref.1]. Then we notice that the frequency-domain translation of the particle's length in space-domain has a continuous spectrum; i.e. it contains a set of frequencies ranging from ω_{max} to ω_{min} . Therefore, as we found in my previous paper [2], this wide set of waves coherently add only at discrete points in space, and mutually nullify their amplitudes at rest of the places and the place at which all the spectral-components of the wide set of waves contained in $\Delta\omega$ will add constructively, will depend on the relative phase of all the spectral components. It is proposed here, that we need to know the relative phase angles of every spectral-component contained in the wide set of waves contained in $\Delta\omega$ for predicting the exact place of detection of the 'particle'.

References:

[1] Tank Hasmukh K. "Expressing energy-momentum four-vector of the Special Relativity in terms of Wave Mechanics" *Physics News* (Published by Indian Physics Association, from Mumbai) , September 1998, p136-139.

[2] Tank Hasmukh K. Tank "Proposed explanations for wave particle duality of light and double-slit-interference of single photons" **viXra:1407.0036**