Quantum rendering

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September 2025

1 Introduction

NOTE: If you are done writing this, check if you can do this without the particles actually being waves and them being just particles.

In this document I try to explain quantum behavior by comparing the world to a game engine. The idea behind writing this paper is that the actual behavior of particles seems to depend on when and where they are observed. The idea I'm trying to explore here is if there are 1, 2 (or perhaps more) different ways the world determines the current location of entities that are within them. Perhaps the "wave function collapse" as soon as something is observed just means that instead of the entities themselves actually moving from A to B, only collisions (observations) are rendered and what we're doing by using quantum computing is finding clever ways to avoid triggering this rendering engine for a certain while across a controlled area and then rendering the solution all at once.

2 The rendering of the universe

When we see an object it is usually only there where you can see it. This can be shown with a few simple examples:

- Your laptop is one entity sitting in front of you and is not at the same time in the trunk of your car.
- if you throw a ball trough the air, it doesn't collide with itsself and randomly change direction

- if you walk on the ground, you don't suddenly fall trough it

In the history of quantum mechanics there has been a long debate on whether particles are either particles or waves. In the end we have come to the conclusion that it's a bit of both. A particle is both a single point in space, and at the same time that location can be described in the form of a wave of probabilities of being in a certain point in space.

3 possible rendering of our universe

For this rendering I'm going to make 2 assumptions:

1: Every particle is a moving wave of probabilities of the particle being there with the probabilities always adding up to one.

2: A particle can not interact with itself.

3.1 The Traveling particle

3.1.1 General behavior

When a wave is traveling has a direction it is traveling in, and each part of the wave has a certain probability between 1 and 0 of the particle actually being there, with 1 being absolutely certain that the particle is there and 0 being absolutely certain that the particle is not there. With the progression of time, this wave keeps spreading according to the amount of energy this particle has.

We denote the probability of a particle P being in location i as P_i defined such that $\sum P_i = 1$

3.1.2 Interaction

When any part of wave A meets with another wave B, an interaction will happen.

this interaction can be either 1 of 2 things:

- With a probability of $A_i * B_i$ the particles collide. When the particle collides it interacts in such a way with the other particle that both momentum and energy is conserved. This happens as follows:

  The probability of both those particles being at location i will be updated to 1, and the probability that they are at another location will be updated to 0. Next, the waves of particle A and B will start to propagate again from the point of collision with the new direction that they got from the collision.

The next part I'm not to sure about but want to test.

But what happens if in the next propagation the waves touch at more than one place? Then the following happens:

At every place the waves touch each other at the same time, the probability check is done. Then, for every place where the probability check succeeds, a new particle with probability 1 will spawn that gets a proportional part of both the energy and the momentum. These particles will then continue to propagate from their point of collision.

- With a probability of $(1 - A_i) * (1 - B_i)$, the particles will NOT collide. The result of this will be that B_i will be subtracted with A_i, and this subtracted probability of A_i will be proportionally distributed along the other possible locations of B. Particle A_i will also be subtracted with B_i with the same proportional distribution along the other locations of A.

  i.e. if B_i gets subtracted with 0.03 and and there is an B_j that has a probability of 0.70, the probability of B_j will get incremented with $0.70 * 0.03 = 0.021$ resulting in the new value of B_j being 0.721.

4 double slit

This wave behavior of a single particle can explain why even if you shoot a single photon at a double slit, you still get an interference pattern.

For the first example we're going to assume that the wave of the photon is wider than the two slits. and that there are no particles in this experiment that interfere with the photon other than the material the slit is made out of and the detector that detects and captures the photons behind the slit.

Firing the photon trough the slit consists of 2 parts, The part before it has passed trough the slit, and the part after it has traveled trough the slit.

4.1 Passing trough the double slit

In the first part we have a certain probability that the wave of the photon will collide with the outside of the slit and bounce back. and we have a certain probability that the wave of the particle will collide with the sides of the slit as it is passing trough the slit and bounce either back to the side of the slit it started at or to the other side of the slit, now with a new angle

4.2 After passing trough the double slit

If the photon makes it trough the slit, directly after passing trough the slit, the center most positions of photon P now have effectively a probability of the photon being there of nearly 0 and the only places of having any chance of the photon having actually passed trough it are the openings in the slit. It looks like there are now 2 waves, but it is still the same one wave and thus can not interfere with itself. We will however name these parts of the wave A and B splitting the probabilities of particle P actually being at place i into PA_i and PB_i You could now interpret this single wave of the photon as it continues propagating as 2 different waves because of the dead zone of probability in the center. Now as the wave propagates towards the detector, Eventually a part of the wave will hit the waves of the detector and either collide with it or do not collide with it according to the rules of interaction specified in the 3.1.2: Interaction