

# Quantum Computing for Art Exploration and Creation

Alain Lioret\*

Universite Paris VIII -Arts et Technologies de l'image

## 1 Introduction

Art is often a question of representation. And representation of life is at the heart of artistic creation. If one dives into very small size scales (beyond the famous Planck constant), we can work on the representation of life at the atomic scale. As everyone knows, at this scale, it is not the principles of classical physics that apply, but those of quantum mechanics. If one is interested in living in this type of dimension, he is faced with a population of protons, photons, electrons and other particles, which form a strange ecosystem, and whose quantum behavior is difficult to understand. The behavior of the elementary particles of our life defies our usual sense of space and time. Also, these particles form a living world in a higher number of dimensions. There are at least four dimensions, and probably more. [1]. As a digital and generative artist, it is quite exciting to be interested in this type of representation, and the use of a computer helps us in this way. Quantum Computers are not yet available, but many simulation tools exist and allow us to make quantum calculations that are no longer based on the classic use of bits, but are instead based on qubits.

## 2 A Matter of Scale

View or create at atomic scale? A utopia? While some scientists are trying very powerful mathematical tools (see in particular about the work of Eric J. Heller), it is rather convenient to just simulate a projection. Just imagine a painting, film or sculpture. Or dive into the depths of our scales just below the Planck constant. So you find yourself in a world governed by quantum mechanics, with confusing principles, where each particle (each artificial being) can, for example, be found in several places at the same time (the principle of quantum ubiquity). This opens up avenues for very interesting artistic creation, especially if we look at a whole population of particles whose behavior defies our logical sense. Because they are living in Time, we call these special particles, Time Beings. Time Beings can take different forms. These artificial beings will thus be classified into different types, depending on the type of artwork they will put into action. Each category corresponds to a minimal entity (a corpuscle or atom). For music, this entity is the note (1D space), while it is the word for Literature and Poetry, the pixel (2D space) for painting and photography (digital), the vertex (3D space) for sculpture and architecture, and the frame (4D space) for Film and Video.

\*e-mail:alainlioret@gmail.com

## 3 An Allegory of Quantum Mechanics

The purpose is not to tackle scientific calculations that would be too complex to implement, but to learn from all the quantum concepts, to apply (the projected artwork) in space time. If we can consider that the elementary particles of digital artworks can be pixels (images), vertices (3D objects) frames (movies), notes (music), etc., then we are equipped for new artistic explorations: space becomes a picture frame, and time becomes the act of creation, as well as the visual journey of the viewer. The concepts of speed, position, rotation, are no longer similar to what we are used to, but follow the quantum principles. Among them, an important phenomenon occurs: the ability to travel through time! To be clear: it is not our time on the human scale, but the existing time in the space of an Artwork.

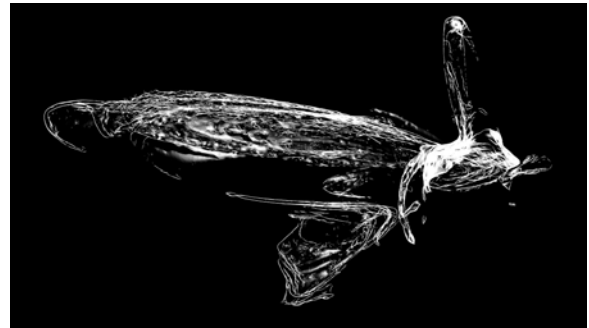


Figure 1: Figure 1. Quantum Swan. Creation by Time Beings.

## 4 Quantum Principles

The research and creation of Time Beings do not stop there! Indeed, as the quantum artwork beings, they may be subjected to all major quantum principles that we know. The quantum theory is an important tool to enable travel in what is often called the fourth dimension, which is Time. It is especially an important part of the functioning of Wormholes, which can help build bridges in space-time. Moreover, in his manifesto for the quantum aesthetic, Gregorio Morales [2] gives an interesting list of quantum principles that can be applied to art.

## 5 Conclusion

Exploring the possibilities of Quantum Mechanics for artistic creation opens new paths to a variety of creative ways. The use of quantum instead of classical calculations is just beginning. Many new artistic explorations are at the corner of our future: Human Future is indeed different from Time Beings' all possible Futures...

## References

- [1] Greene Brian, The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory . 1999
- [2] Manuel J. Caro et John W. Muprhy, The World of quantum culture, (tats-Unis), Praeger, 2002.