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The Shape of Uncertainty

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The Shape of Uncertainty

Concept, Thought Process, and Connection to Quantum

By Jack Schnepf

Abstract

"The Shape of Uncertainty" is a painting created through my collaboration with QCORE, Montana State University's quantum computing research initiative. The work bridges the languages of art and science, exploring how painting can visualize the principles of quantum computing, such as superposition, entanglement, and the role of observation in shaping reality. Through this painting, I seek to demystify quantum mechanics by showing how these principles exist not only in abstract theory but also in life's everyday experiences, inviting viewers to encounter unseen structures of reality through light, movement, and perception. My artistic practice has long been centered on translation, creating paintings that communicate complex human experience in simple ways that connect to the soul. My work is guided by a goal of inspiring empathy and deepening understanding of ourselves and the world around us. Through a personal lens, I explore emotional and psychological complexity, reflecting on memory, healing, vulnerability, empowerment, and the space between consciousness and the physical world. Over time, this process has evolved into diving into the unknown, whether through a new medium or idea, and discovering clarity through creation itself. "The Shape of Uncertainty" extends this pursuit into the scientific realm. The painting emerged from conversations with physicists, leadership, and researchers at QCORE, exploring how art can contribute to scientific discovery and research translation. Quantum mechanics reveals a world where observation alters outcome, where particles exist in multiple states simultaneously, and where uncertainty is foundational rather than a flaw. These ideas took form through imagery grounded in Montana. The horse, a familiar symbol of the West, became a way to translate quantum principles into something tangible. When running together, horses appear as a single wave, yet up close their individuality becomes clear, much like how light behaves as both a wave and a particle. In their power, the horses reflect quantum computing itself: an immense, untamed force shaped by human ingenuity, just as humans domesticated the wild horse. Points of detail anchor the viewer, while areas of abstraction leave room for reflection and discovery. Through three-dimensional forms and translucent layers of paint, the work resists a single interpretation, embodying the essence of quantum behavior and giving shape to uncertainty. Visitors were invited to add their own small chalk marks representing particles of light above the horses' heads, mirroring quantum uncertainty and measurement. Each mark was placed intuitively, appearing as chaos at first, yet over time, patterns began to emerge, reflecting how statistical order arises from randomness in quantum systems. Visitors unknowingly entangled themselves with each other through shared participation in the living, expanding system that the painting embodies. Ultimately, the painting invites viewers to experience quantum not as an abstract or complex theory, but as a metaphor for how we perceive, connect, and find meaning within the unknown.

Broken Down Connections to Quantum: The Title and Core Concept:

The title, "The Shape of Uncertainty," is a paradox that grounds this piece. It proposes that the formless and probabilistic nature of the quantum world can be given tangible shape through art. The painting uses the familiar subject of running horses to explore fundamental concepts of quantum computing, creating a bridge for viewers between a classical image and a quantum idea.

Superposition: The Horse in All Possible Strides

A running horse, especially at full gallop, exists classically in a single position at any given instant. However, in a quantum sense, this painting suggests it exists in all possible positions simultaneously until it is observed. The blurred, overlapping forms are not just motion blur; they represent the horse existing in a multitude of potential states. With close examination, the viewer can find the more detailed "measured state" of the main horse with the textural waves of Venetian plaster subtly showing a ripple of possibility leading to this moment of collapse.

Uncertainty & Measurement: The Observer's Effect

The hazy, abstracted areas of the painting convey the inherent uncertainty in quantum mechanics. A quantum system remains undefined until it is measured, a process I've tried to embody in this piece. Viewers are invited to thoughtfully examine the work, particularly the main horse's face and eye. In this moment of focused observation, the form becomes more defined and "measured." The shiny and textural charcoal particles floating within the undefined horses can be seen as individual quantum particles in a probabilistic cloud, awaiting a quantum event" to be observed and defined.

Entanglement: The Linked Herd

While the painting has a central focus, the presence of multiple horses allows for a conversation about entanglement. Much like a herd of horses running in perfect unison—their movements so coordinated, they seem connected beyond simple proximity—the forms in this painting are interconnected. The central horse is subtly intertwined with the other forms through overlapping shapes, implied forms through color shifts and "ghost" entangled limbs. Fine applications of charcoal and plaster subtly connect these forms, symbolizing a shared destiny that transcends physical distance.

Wave-Particle Duality: The Flow and the Form

Running horses create a dynamic "wave" of motion and energy, but they are also distinct "particles" (individual horses). My uses of Venetian plaster as a textural wave and shiny charcoal as individual particles further support this idea. Just as light can behave as both a wave and a particle, these running horses embody both a continuous flow of energy and distinct, resolved forms, offering a visual parallel to quantum duality.

The Quantum Promise

Horses have long symbolized speed, power, and freedom. Quantum computing similarly promises to unlock unprecedented computational power and solve problems previously thought impossible. The energy and dynamic motion of these horses reflect that profound leap in capability; much like a horse can navigate complex terrain with incredible agility, quantum computers are designed to navigate vast, complex problems that classical systems cannot.

Visitor-Placed Particles: A Living System

The painting is an open-ended system. During the process of creating this piece, visitors were invited to add their own "particles"—small dots of paint—in a designated place, following minimal instructions. This act introduced a participatory layer that directly mirrored quantum uncertainty and measurement. Each particle was placed intuitively, appearing at first as chaos. Yet over time, patterns emerged from the accumulation, reflecting how statistical order arises from randomness in quantum systems. In this process, visitors unknowingly entangled themselves with each other through shared authorship. Their presence and participation were not supplementary—they were essential to completing the living, expanding system the painting embodied.



About the Author

Jack Schnepf is a recent graduate (Fall 2025) of Montana State University, where he earned a BFA in Studio Art with a focus on drawing and painting. He has worked with QCORE, MSU's Quantum Collaborative Research and Education initiative, as Executive Administrator and Artist-in-Residence, where he used painting to help demystify quantum mechanics through visual translation. His work explores art–science collaboration, consciousness, personal introspection, and nature, creating artwork that inspires empathy and a deeper understanding of ourselves and the world around us. Through this practice, Schnepf seeks to repair a fractured world by targeting the sources of its unrest.

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